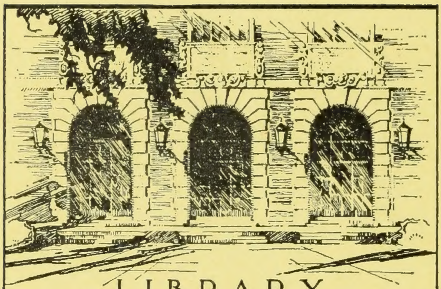

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FOURTH ANNUAL REPORT

OF

The Department of Public Works and Buildings

Division of Highways

July 1, 1920
TO
December 31, 1921

AUG. 26TH 1818

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C. R. MILLER, Director
FRANK T. SHEETS,
Superintendent of Highways
CLIFFORD OLDER,
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[Reprinted from the Fourth Administrative Report. Printed by authority of the State of Illinois.]

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DIVISION OF HIGHWAYS.

Frank T. Sheets, *Superintendent of Highways.*
Clifford Older, *Chief Highway Engineer.*

For convenience and efficiency the work of the Division of Highways is administered through six bureaus: namely, the Bureau of Design; Bureau of Construction; Bureau of Maintenance; Bureau of Tests; Bureau of Machinery, and Bureau of Audits. In order to facilitate the field work, nine geographical districts have been established with a district engineer in charge of each who reports to the various bureau chiefs according to the nature of the work involved.

Following is a summary of the duties of the various bureaus:

Bureau of Designs.—Making reconnaissance surveys prior to the general location of State Bond Issue and Federal-aid roads; making detailed surveys and preparing plans, estimates, proposals, specifications and contract forms for all Federal-aid, State Bond Issue and State-aid road and bridge work; preparing descriptions and plats and superintending the purchase of right-of-way for State Bond Issue, Federal-aid and State-aid roads; preparing plans of county and township bridges and checking all bridge plans submitted for approval according to law; giving consulting service to highway officials on road and bridge work; checking road and bridge proposals, plans, estimates, and contracts submitted for approval according to section 15d of the road law. For convenience, the work of this bureau is subdivided into a road office and bridge office under the supervision of the road engineer and bridge engineer respectively.

Bureau of Construction.—Supervising the construction of roads and bridges built under the supervision of the division and making final inspection when completed; checking and passing upon estimates allowed contractors for work done; supervising the preparation of Federal-aid reimbursements in payment for completed Federal-aid roads; supervising statistics prepared on completed work; supervising the distribution of crushed stone supplied by the two State penitentiaries; directing the supervision of day labor construction.

Bureau of Maintenance.—Inspecting, repairing, and maintaining roads built under the jurisdiction of the division which, when accepted in accordance with the provisions of the law, are taken over by the State for maintenance.

Bureau of Tests.—Testing and approving of materials used in the construction or maintenance of roads and bridges built under the jurisdiction of the division; testing, upon request of county and township officials, materials used in county or township road and bridge construction.

Bureau of Machinery.—Receiving and placing in storage trucks and other equipment and materials allotted to the State by the Federal Government; arranging for rental of such equipment to contractors on road work, counties, townships, and other municipalities; repairing and distributing of such equipment; and keeping systematic records in connection therewith.

Bureau of Audits.—All of the accounting and clerical work in the division is handled in this bureau under the direction of the chief clerk.

The details of the work of the Division of Highways are shown in the following pages under the headings of the various bureaus of the division. However, there are certain especially interesting phases of the division's activities which should be pointed out.

FEDERAL-AID.

In previous reports, the Federal-aid road system has been described and the fact was stated that the State had received an appropriation of approximately $12,000,000 from the Federal Government and had met this with an appropriation of approximately $15,000,000 to be derived from motor license fees.

At the beginning of the period covered by this report, there were a number of gaps in the Federal system for which no contracts had been awarded. During the period of this report, contracts have been let covering practically all of these gaps, and the entire Federal road system has been completed with the exception of a few short spaces where grade separations or similar projects are pending. However, on December 31, 1921, the entire Federal system is opened to traffic and may be traversed throughout its entire length at all seasons of the year. Where pavement has not as yet been completed, suitable temporary cinder or gravel wearing surfaces have been placed.

Recently Congress appropriated a further sum of $75,000,000 to the various states for Federal-aid road work and Illinois' proportion of this sum will be approximately $3,250,000. This will insure the continuation of the Federal-aid work in the State.

STATE BOND ISSUE ROADS.

Prior to January 1, 1921, practically no work had been done on the State bond issue system except such preliminary steps as the reconnaissance surveys, the fixing of the general location of respective routes, the making of surveys, and the preparation of plans and estimates. After this date, however, steps were taken to prosecute State bond issue work actively. On February 18, bids were taken for a large mileage of roads on this system. When these bids were analyzed, it was found that the price for an 18-foot concrete pavement averaged approximately $39,000 to $40,000 per mile including a normal amount of grading, culvert, and bridge work. Also bids were received at the same time for considerable heavy grading and bridge work. It was felt that the prices asked for pavement on that date did not reflect the prevalent economic conditions and these bids were rejected and a public statement given out by the Governor and the director of the department that no contracts would be let for an 18-foot Portland cement concrete pavement having a normal amount of grading, culvert, and bridge work where the price exceeded $30,000 per mile.

This decision resulted in a storm of criticism on the part of certain people who did not understand the conditions of the construction market, and on the part of certain interests who demanded that the road work should proceed regardless of cost. However, this policy was adhered to and in subsequent lettings throughout this year 704 miles of pavement have been awarded well within the figures above stipulated. In fact, the average for all Portland cement concrete pavements 18 feet in width awarded directly by the State since January 1, 1921, has been $28,553 per mile. A corresponding reduction in the price of grading and bridge work has been effected, and this reduction is shown in detail in the later parts of this report. During the year of 1921 there were awarded 704 miles of pavements at a total cost of $19,647,990. In addition, grading and bridge contracts were awarded making the total value of contracts let for the year $23,133,805. On December 31, 1921, there are 542 miles of uncompleted contracts for pavements.

It is not claimed that all roads in the State can be built at the $30,000 per mile figure. In certain sections, topographic conditions are such that deep cuts and fills must be made and large bridges must be constructed. In such cases this work must be done prior to the laying of the pavement slab in order to avoid danger of damage due to settlement. Such highways, of course, are expensive, but the indisputable fact remains that during the year 1921 pavements having a normal amount of grading and bridge work which previously were costing over $40,000 per mile have been awarded at a figure under $30,000 per mile.

An examination of the progress map included with this report will reveal that the mileage under contract constitutes principally a trunk line system of roads extending the scope and usefulness of the Federal-aid road system already completed.

1922 PROGRAM.

The program for the year 1922 contemplates the completion of 1,000 miles of durable hard surfaced pavements on the State bond issue system as well as the carrying on of a large volume of heavy grading and bridge work which must be undertaken in certain sections of the State in advance of the paving operations. In so far as transportation facilities and material supplies will permit, the paving program will be confined to continuous trunk lines. However, the mileage of such work which can be prosecuted in any year is necessarily limited. Therefore, the trunk line program will be supplemented by a program of paving of grading sections on Bond Issue roads in all the counties of the State not touched by the trunk line program. By so doing, the amount of work which it is possible to complete during the coming year can be greatly increased, and subsequent years will connect any isolated sections which may be thus built.

During the construction season of 1920, 347 miles of pavement were completed, and during the construction season of 1921 the pavement completed amounted to 405 miles. It is readily seen that the contracts now unfinished and carried over into 1922 constitute a paving program much larger than has ever before been undertaken by the division. It is intended to continue the letting of contracts during the spring months so that enough work will be placed under contract to insure the completion of the 1,000 miles of pavement during 1922. In brief, the 1922 program can be summarized by Governor Small's slogan, "A thousand miles of completed pavement, State Bond Issue work prosecuted in every county of the State, and a dollar's worth of roads for every dollar expended."

FINANCES.

Up until October 25, 1921, all road work on the State Bond Issue system has been financed by means of Federal-aid appropriations and automobile license fees. The State bond issue of $60,000,000 remained untouched until that date. At that time, however, it became apparent that the motor vehicle license fees would be temporarily exhausted and that it would be necessary to market some of the State road bonds. Accordingly, the Governor, the Director of the Department of Public Works and Buildings, and other State officials arranged for the sale of these bonds. Fifty-one auction bids were submitted by 34 different banking and trust companies with the result that these 4½ per cent bonds were sold at 94.02 resulting in an interest rate of 4.82½ per cent.

Some money has already been expended as a result of the sale of these bonds, and additional bonds will have to be sold as the construction work progresses during 1922.

GENERAL ACTIVITIES.

The reader's attention is directed to subsequent parts of this report in which the activities of the division relating to day labor road construction, consulting services to counties and townships, testing and inspection of materials, maintenance costs, and the use and distribution of surplus war equipment and machinery are set forth.

INVESTIGATIONAL AND RESEARCH WORK.

The division has been conducting a most extensive and practical series of investigational and research work in highway engineering. The most spectacular portion of this work is the Bates experimental road approximately two miles in length. Sixty-three different sections of pavements were laid on this highway consisting of Portland cement concrete, brick, and asphalt of various thicknesses and combinations. During the year 1922 it is proposed to subject this pavement to a severe service test by means of carefully regulated motor truck traffic. Much valuable information has already been secured from this experiment, and much more valuable information will be secured as the test proceeds. The information gained thus far has led to a change in pavement design which will result in much stronger pavements at reduced costs.

NEW MAINTENANCE LAW.

The Fifty-second General Assembly passed a most progressive piece of highway legislation providing for a system of State highways. This law specifies that the Department of Public Works and Buildings may take over for maintenance the State Bond Issue road system whether completed or not, and, as funds become available, the Department may also take over the State-aid road system of the State as laid out in the several counties. The law further stipulates that until the Department of Public Works and Buildings shall take over the State-aid system of roads, the respective county boards shall be responsible for their maintenance, and provides for the levying of a special tax not exceeding 25 cents on the $100 equalized assessed valuation to be known as a county highway tax.

This centralization of authority in the maintenance of the main county roads should result in greatly improved road conditions within the near future. At this time, the Department has not assumed the maintenance of the State Bond Issue road system, but in all probability plans will be worked out for undertaking this during 1922.

BUREAU OF DESIGN.

During the past fiscal year the work of the Bureau of Design has made another large increase in volume. The number of miles and the estimated cost of the road work for which plans have been prepared under the direction of the Road Office has approximately doubled. A large mileage of State Bond Issue contracts was awarded and plans are practically finished now and awaiting an early letting for a large additional mileage. A large number of heavy grading contracts have also been awarded. It is necessary to permit the heavier fills to settle at least a year before placing the pavement and consequently such work is let well in advance of the paving contracts. Bridge work is constantly on the increase not only in regard to the number of plans turned out for the work done directly by the State, but also in the number of plans checked for the counties on 15d and township work. The reduction of prices during the past year has been a great stimulus for bringing about this increased amount of work done by the counties. During the past year practically all remaining contracts have been awarded to use up the State-aid appropriation made in 1917 and for which work was held up due to war conditions. One of the largest activities of this bureau is the purchasing of right of way. This work is constantly on the increase because of the larger program of work outlined for the coming year. All right of way for State Bond Issue roads is paid for by the local people, but this bureau prepares the detailed options, descriptions, plats, and dedication forms for all such right of way required. During the past year application was made to the Illinois Commerce Commission for the separation of a number of grade crossings. This is a rapidly growing feature of the work of this bureau.

LOCATION OF ROADS, SURVEYS, AND PLANS.

Before the location of the State Bond Issue or Federal-aid roads is decided, a reconnaissance survey is made by a party of competent engineers. All possible routes are investigated, and a report is made showing the comparisons of the various routes with respect to mileage to travel, mileage to build, cost, number of sharp turns, number and character of grade crossings, maximum percentage of grade and population served. With this information available, a public hearing is held at which the local interests are invited to advance their preferences. Upon the basis of the information derived from the engineering reports and the public hearing, the final location is decided. Approximately 60 per cent of the State Bond Issue roads have been located to date. Surveys and plans have been completed for more than 2,000 miles of road.

CHANGES IN ROAD DESIGN.

Engineering investigations conducted in conjunction with the Bates Experimental Road are beginning to show results. During the past year a complete change was made in the design of the concrete pavement. By adding a small amount of reinforcing steel near each edge of the pavement and placing a concealed joint along the center of the pavement slab, and tying the two slabs together with reinforcing steel, it has been possible to reduce the thickness of the pavement to seven inches and still leave a stronger pavement than the original eight-inch thickness used the year before. This also resulted in a saving of cost. Results obtained to date from experiments on the Bates Experimental Road have proved the adequacy of the new design. An 18 foot pavement is now considered the minimum double-traffic road for the State Bond Issue system, and 20 feet is preferred near the larger centers of population. The shoulder to shoulder width of all roads in the system has been established at 30 feet, and all small culverts and bridges will have a roadway equal to the shoulder to shoulder width of the road. For economic reasons the larger bridge structures have a 20 foot roadway. Rapid strides have been made during the past year in regard to quality of highway alignment. Right-angled turns are eliminated wherever possible and where it is necessary to make such turns a minimum radius of 500 feet is used. All curves which have a radius of less than 6,000 feet are super-elevated or banked so as to enable automobiles to travel at a conservative uniform speed without danger of skidding or over-turning.

BRIDGE DESIGN.

More attention is being given the aesthetic features of bridge design. During the past year an open concrete rail design was employed which gives variety to the appearance of concrete bridges. A number of new standards were added during the past year and an increasing number of larger structures were designed to meet special conditions.

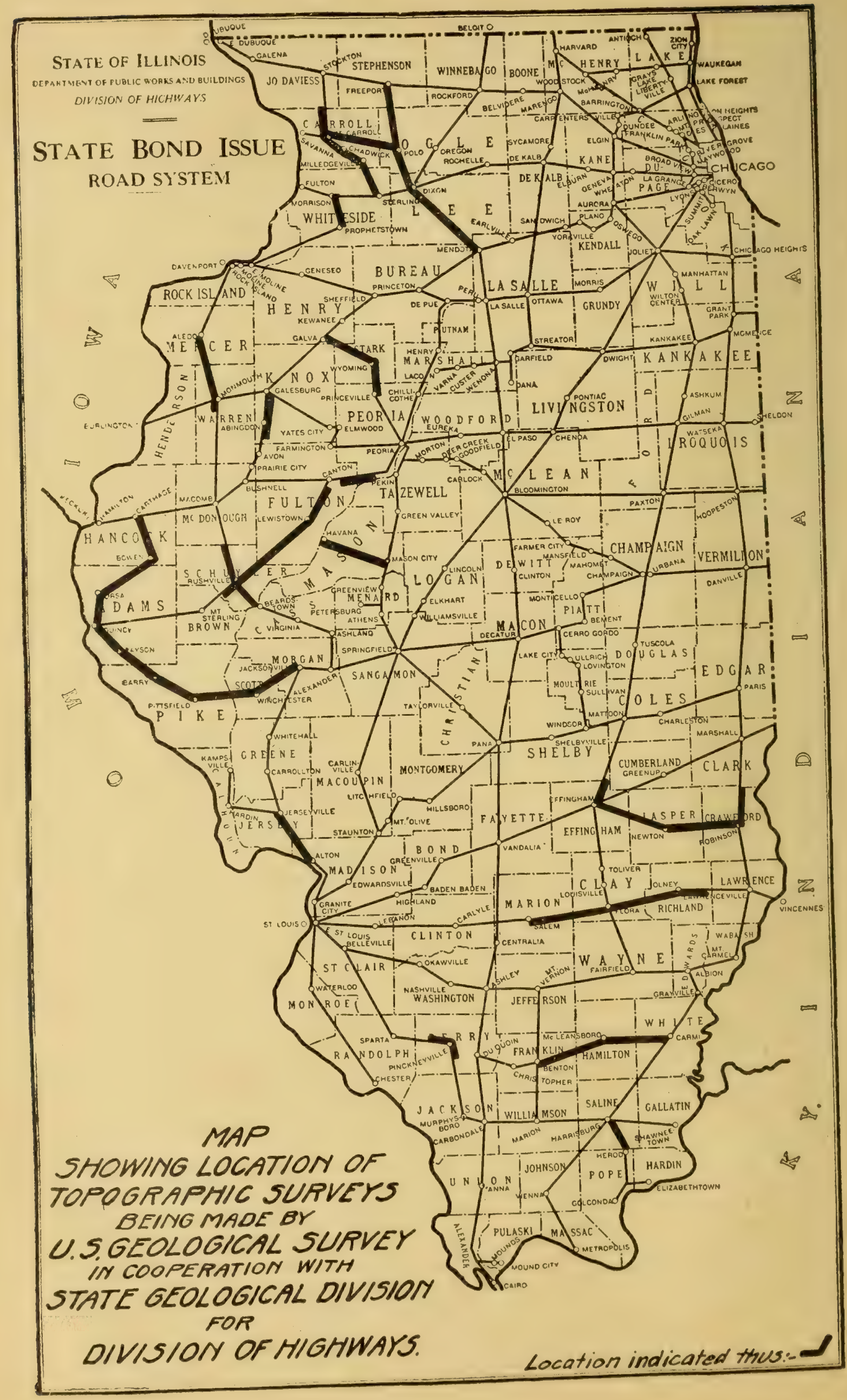
TOPOGRAPHIC WORK.

Topographic work in the State of Illinois, which is being carried on by the United States Geological Survey and the State Gelogical Survey, has been planned so as to be of the greatest assistance to the highway program. The Division of Highways furnished the State Geological Survey Division with maps showing the location of the routes where the most difficult location problems would be encountered, and topographic surveys are now being made for strips three to five miles in width along these routes. The topographers forward their field maps to the Division of Highways as soon as they are completed, and these maps are used in connection with the location of the Bond Issue routes. The State is thus saved expensive topographic surveys and at the same time the Geological Survey Division is able to carry on its own work to advantage.

TABLE 1—FEDERAL AID ROAD WORK.

PAVEMENT.

Contracts awarded.	Miles.	Contract cost.	Cement.	Total cost.
Prior to June 30, 1920	589.58	$15,459,511 99	$4,071,623 79	$19,531,135 78
June 30, 1920 to January 1, 1921	3.00	86,063 85	21,445 12	107,508 97
January 1, 1921 to January 1, 1922	30.77	663,927 20	201,715 37	865,642 57
Totals	623.35	$16,209,503 04	$4,294,784 28	$20,504,287 32



MAP
SHOWING LOCATION OF
TOPOGRAPHIC SURVEYS
BEING MADE BY
U.S. GEOLOGICAL SURVEY
IN COOPERATION WITH
STATE GEOLOGICAL DIVISION
FOR
DIVISION OF HIGHWAYS.

Location indicated thus:- ▬

TABLE 1—FEDERAL-AID ROAD WORK—Concluded.

GRADING AND BRIDGES.

Contracts awarded.	Miles.	Contract cost.	Cement.	Total cost.
Prior to June 30, 1920	40.22	$ 727,776 92	$23,744 38	$ 751,521 30
June 30, 1920 to January 1, 1921	134.86	2,052,111 45	34,087 14	2,086,198 59
January 1, 1921 to January 1, 1922	0.30	7,782 25	508 86	8,291 11
Totals	175.38	$2,787,670 62	$58,340 38	$2,846,011 00

SEPARATE BRIDGES.

Contracts awarded.	Number of bridges.	Contract cost.	Cement.	Total cost.
Prior to June 30, 1920	9	$ 197,231 42	$14,105 92	$ 211,337 34
June 30, 1920 to January 1, 1921	81	1,278,975 64	62,649 73	1,341,625 37
January 1, 1921 to January 1, 1922	None			
Totals	90	$1,476,207 06	$76,755 65	$1,552,962 71
Total cost of all Federal-aid road work awarded to date		$20,473,380 72	$4,429,880 31	$24,903,261 03

TABLE II—STATE BOND ISSUE—WORK AWARDED JANUARY 1, 1921, TO JANUARY 1, 1922.

PAVEMENT.

Miles awarded	607.33	
Contract cost	$13,181,052.52	
Cement	4,173,093.19	
Total cost		$17,354,145.71

HEAVY GRADING.

Miles awarded	270.50	
Contract cost	$1,730,930.42	
Cement	65,099.46	
Total cost		1,796,029.88

SEPARATE BRIDGES.

Number of bridges	144	
Contract cost	$1,369,052.02	
Cement	122,146.20	
Total cost		1,491,198.22
Total all State Bond Issue work awarded to date		$20,641,373.81

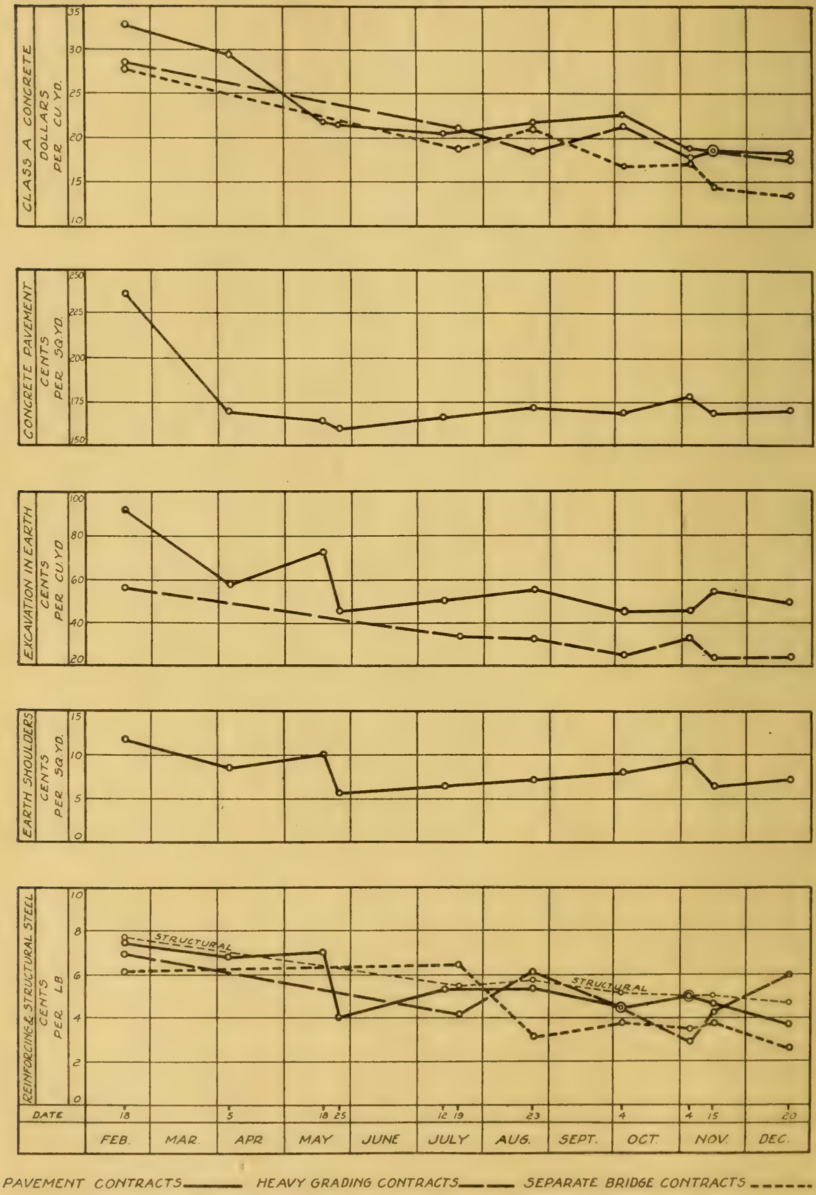
NOTE:—No work paid directly out of the $60,000,000 Bond Issue, awarded prior to January 1, 1921.

TABLE 111—WORK AWARDED JANUARY 1, 1921 TO JANUARY 1, 1922.

PAVEMENT.

Class.	Miles carried over from 1920.	Miles awarded 1921.	Total.	Miles completed 1921.	Miles uncompleted Jan. 1, 1922.	Total cost of pavement awarded during 1921, including cement.
Federal-aid	160.20	30.76	190.96	188.63	2.33	$ 865,642 57
State Bond Issue		607.33	607.33	95.87	511.46	17,354,145 71
State aid	10.51	5.09	15.60	13.13	2.47	115,679 45
County 15d	68.40	61.14	129.54	104.10	25.44	1,312,523 18
Totals	239.11	704.32	943.43	401.73	541.70	$19,647,990 91

GRAPHS SHOWING UNIT PRICE RANGE
ON PRINCIPAL ITEMS
IN HIGHWAY CONSTRUCTION DURING 1921



Note:- Unit Prices for February 18th are based on low bids. Unit Prices for all other lettings are based on awarded costs. Weighted averages are used for all items.

HEAVY GRADING, (including small drainage structures).

Class.	Awarded during 1921.		Total cost of work awarded during 1921, including cement.
	Miles.	Cu. yds. of excavation.	
Federal-aid	.30	6,205	$ 8,291 11
State Bond Issue	270.50	3,773,739	1,796,029 88
State aid	2.22	12,167	11,447 49
County 15d	17.57	87,115	100,154 52
Totals	290.59	3,879,226	$1,915,923 00

SEPARATE BRIDGES (includes both concrete and steel).

Class.	Awarded during 1921.			Total cost of work awarded during 1921, including cement.
	Number of sections.	Number of bridges.	Cu. yds. of concrete.	
Federal-aid	-------	-------	-------	-------
State Bond Issue	76	144	39,527	$1,491,198 22
State aid	6	19	976	21,280 39
County 15d	2	2	1,332	57,412 82
Totals	84	165	41,835	$1,569,891 43

Total cost of paving awarded directly by State during 1921	$18,335,467.73	
Total cost of paving awarded by counties under Sec. 15d during 1921	1,312,523.18	
Total cost		$19,647,990.91
Total cost of heavy grading awarded directly by State during 1921	$1,815,768.48	
Total cost of heavy grading awarded by counties under Sec. 15d during 1921	100,154.52	
Total		1,915,923.00
Total cost of separate bridges awarded directly by State during 1921	$1,512,478.61	
Total cost of separate bridges awarded by counties under Sec. 15d during 1921	57,412.82	
Total		1,569,891.43
Grand total of work awarded in 1921		$23,133,805.34

SERVICES RENDERED RELATING TO BRIDGES.

The principal activities of the bridge office are as follows:

Preparation of plans, specifications and estimates for all State bridge work.

Preparation of plans, specifications and estimates for County and Township bridge work, when requested to do so by the County Superintendents of Highways.

Checking and approval of plans for highway bridges prepared by County Superintendents of Highways, or other engineers.

Investigation and analysis of existing highway bridges to determine strength and advisability of making repairs.

Checking and approval of detailed shop drawings for steel bridges.

Shop inspection of structural steel for bridges, to correct errors in fabrication.

Preliminary surveys and investigation of sites for new bridges.

Furnishing advice and assistance to County Superintendents of Highways and other highway authorities on all matters dealing with highway bridge work.

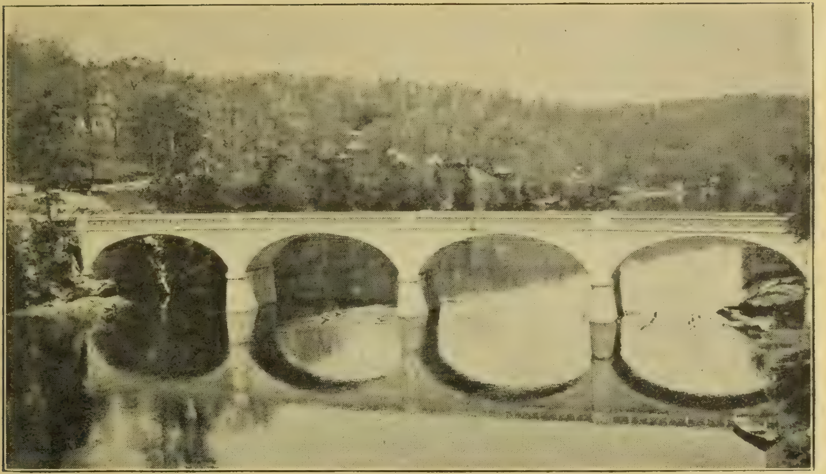
Preparation and distribution of General Specifications for Bridge Work, which under the Road and Bridge Law must govern the design and construction of all bridges and culverts upon the public highways of the State.

The amount of work handled since the Highway Department was created is summarized briefly in the following table:

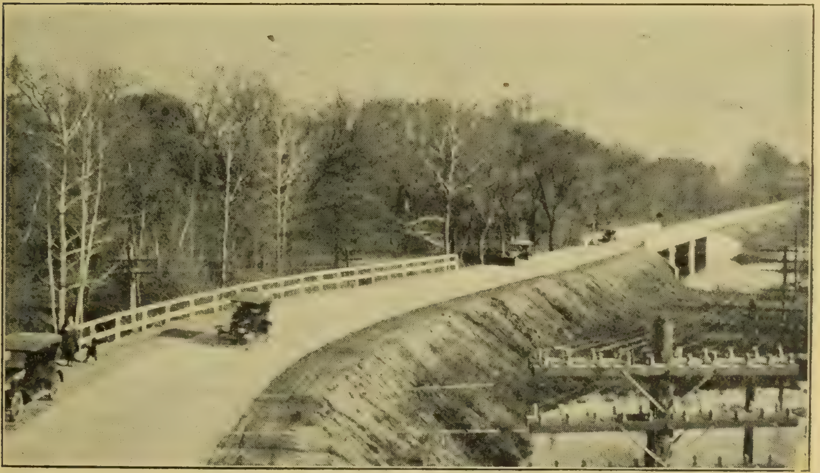
SUMMARY OF BRIDGE WORK TO DECEMBER 31, 1921.

Year.	Plans and Specifications Prepared.	Estimated Cost.	Contracts let on State Plans	Contract Price.	Foreign plans Approved.
1906	15	----------	11	$ 37,035 00	Plans prepared by county Sup't. of Highways and others outside of Division of Highways.
1907	113	----------	48	41,519 00	
1908	149	----------	64	165,674 00	
1909	122	----------	92	133,285 00	
1910	203	----------	141	148,432 00	
1911	241	----------	127	238,903 00	
1912	214	----------	150	212,694 00	
1913	238	$ 342,052 00	139	200,834 00	5
1914	269	470,363 00	109	184,792 00	269
1915	707	984,420 00	565	541,509 00	230
1916	735	1,169,743 00	439	566,657 00	653
1917	480	812,614 00	502	582,993 00	503
1918	206	499,702 00	169	277,130 00	443
1919	231	761,458 68	202	514,897 00	725
1920	443	2,841,896 22	301	2,208,494 84	261
1921	375	2,098,986 49	339	1,928,631 44	362
Total	4,741	$9,981,235 39	3,398	$7,983,480 28	3,451

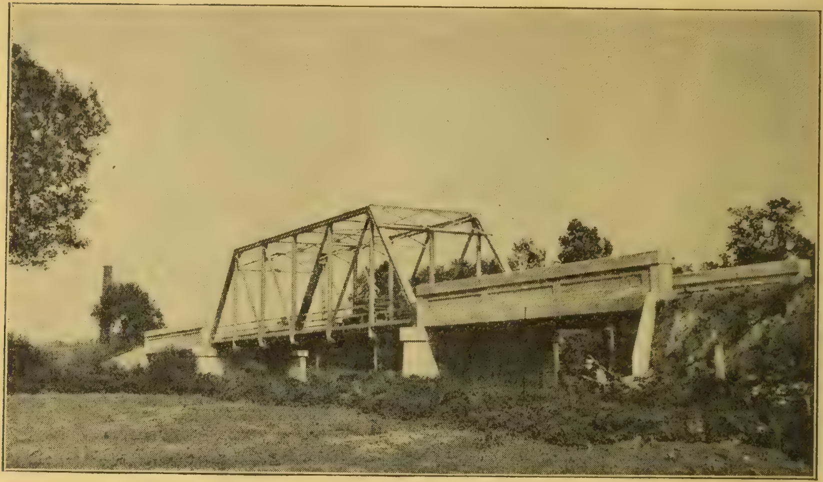
The above table does not include bridges and culverts built in connection with State-aid, Federal-aid and State Bond Issue road work, as such structures are included in the reports on road construction. Since January 1, 1921, plans have been prepared for 4,570 bridges and culverts, to be constructed in connection with State road contracts, estimated cost $2,153,562.64. Adding this to the distinctive bridge work given in the table, the output of the Bureau of Design, since January 1, 1921, has been 4,945 plans for bridges and culverts, estimated to cost $4,252,549.13. The average cost of preparing these plans and specifications has been 1.66 per cent of the estimated cost of the work.



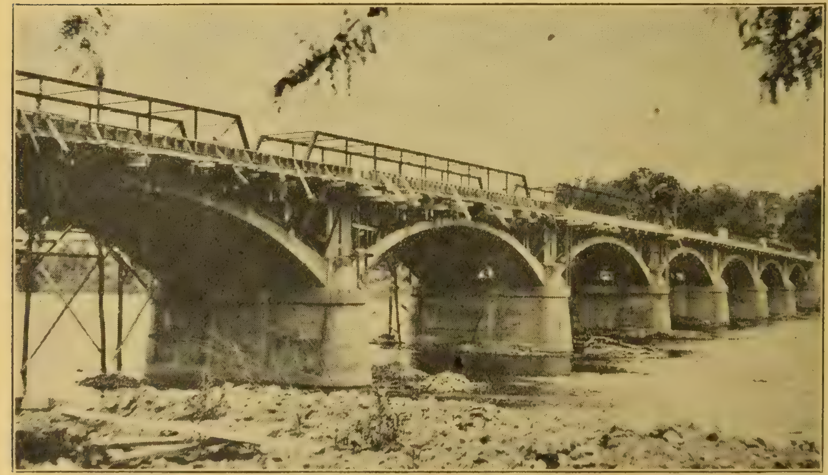
Sheridan Bridge over Fox River near Sheridan in LaSalle County. Reinforced concrete arches, four spans at 55 feet each. Completed 1920. Contract price, $23,450.



Springfield-Peoria Road at Sangamon River north of Springfield, showing 18-foot concrete pavement and reinforced concrete overflow bridge consisting of three spans at 40 feet each.



Station 1334+45, Section L, Effingham County. Over Little Wabash River west of Effingham. One steel span at 100 feet; two concrete spans at 50 feet each. Completed 1920. Contract price $25,000.



Engels Bridge over Kankakee River at Wilmington. Picture taken during construction. Completed 1921. Reinforced concrete open spandrel arches. Seven spans at 68 feet each. Contract price $82,987.

The following tables indicate approximately the relation between State and County bridge work, as determined by the preparation of plans by the Bureau of Design and the awarding of contracts. These tables do not give the exact proportion, as a number of County Superintendents of Highways prepare their own plans and submit to the department for approval.

FROM JULY 1, 1920 TO DECEMBER 31, 1920.

Classification.	Plans Prepared.		Contracts Awarded.		
	Number	Estimated Cost.	Number.	Estimated Cost.	Contract Price.
County bridges	193	$ 518,394 00	145	$ 277,567 64	$ 287,828 63
State bridges	67	1,105,704 51	87	1,182,432 72	1,360,258 36
In State road contracts	471	420,264 90	----------	(With pavement)	
Total	731	$2,044,363 41	232	$1,460,000 36	$1,648,086 99

FROM JANUARY 1, 1921 TO DECEMBER 31, 1921.

Classification.	Plans Prepared.		Contracts Awarded.		
	Number	Estimated Cost.	Number.	Estimated Cost.	Contract Price.
County bridges	278	$ 923,407 00	169	$ 453,546 00	$ 361,556 52
State bridges	97	1,175,579 49	170	1,757,761 13	1,567,074 92
In state road contracts	4,570	2,153,562 64	----------	(With pavement)	
Totals	4,945	$4,252,549 13	339	$2,211,307 13	$1,928,631 44

Other work performed during the year 1921:

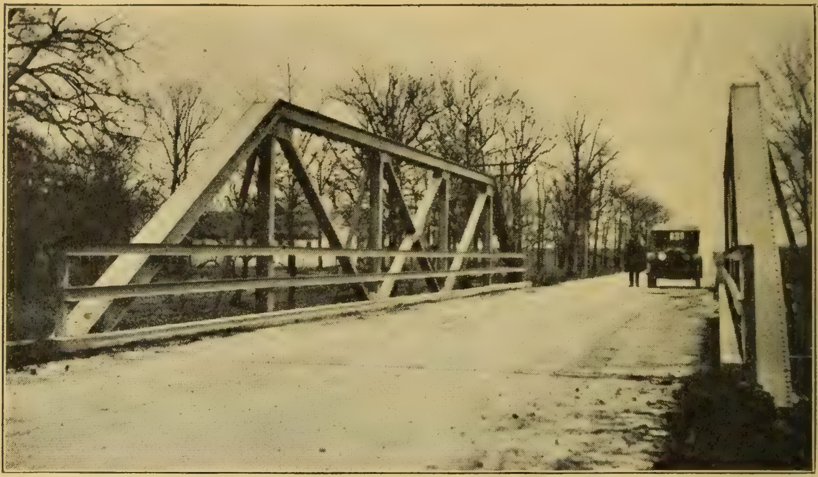
Plans checked and approved for County Superintendents of Highways	362
Existing bridges analyzed for strength	10
Shop drawings for steel bridges checked	35
Shop inspection of steel bridges	36

COMPARATIVE COST OF BRIDGES BUILT WITH TOWNSHIP AND COUNTY FUNDS.

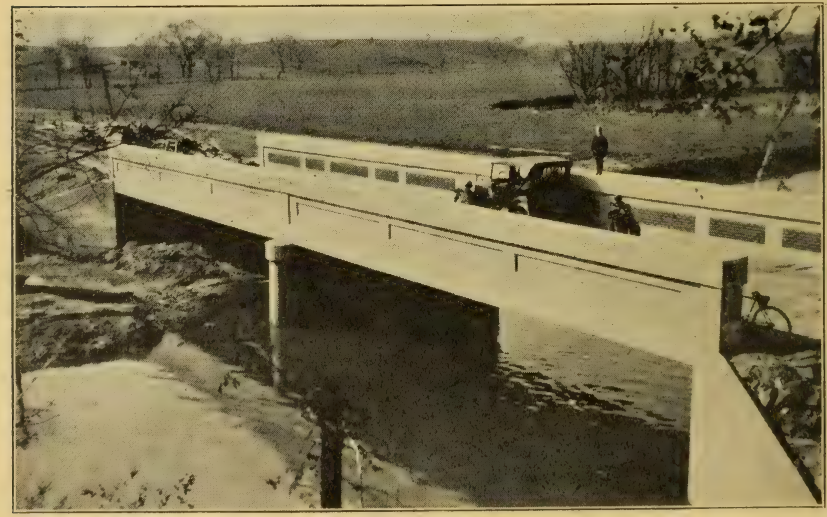
The accompanying curve shows the relative unit cost per cubic yard of concrete for reinforced concrete slab and through girder bridges for a period from 1907 to 1921. The average unit cost was obtained by dividing the actual contract price by the total yardage in the structures considered. The curve shows a range of cost for slab bridges from a low point of $12.05 per cubic yard in 1915 to a high point of $30.90 per cubic yard in 1920. The unit cost of through girder bridges runs slightly higher than that of slab bridges, due to the fact that more steel per cubic yard is required, and more expense is involved in building forms and placing concrete.

STANDARD BRIDGE PLANS.

Since the conditions at a large number of sites for small highway bridges are substantially the same, the Bureau of Design has prepared

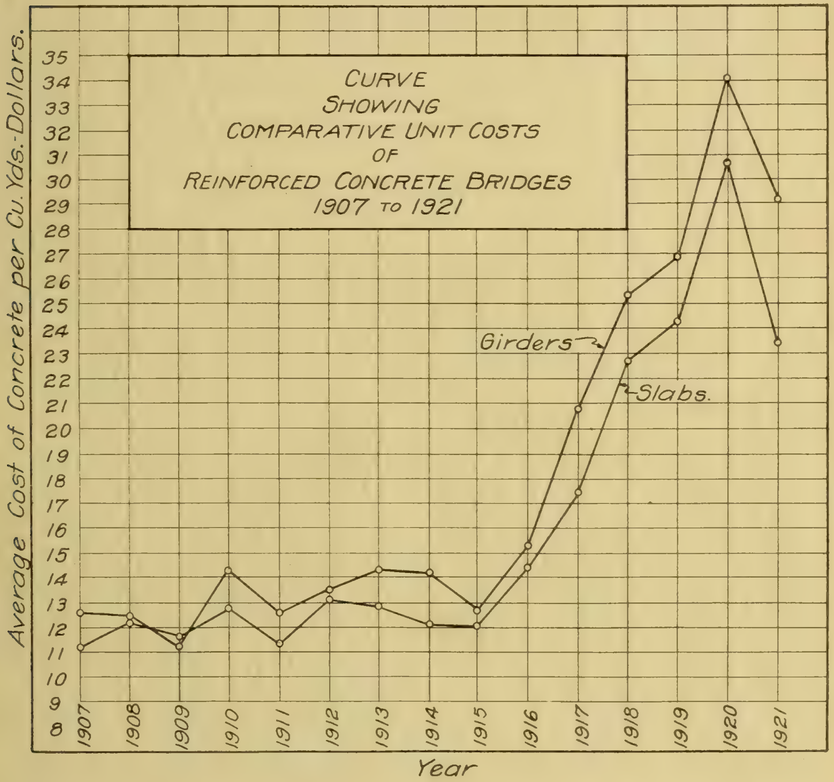


Station 782+00, Section Q, Grundy County. Pony truss with monolithic concrete floor and pavement. Span 80 feet, roadway 20 feet. Built 1920. Contract price $10,000.

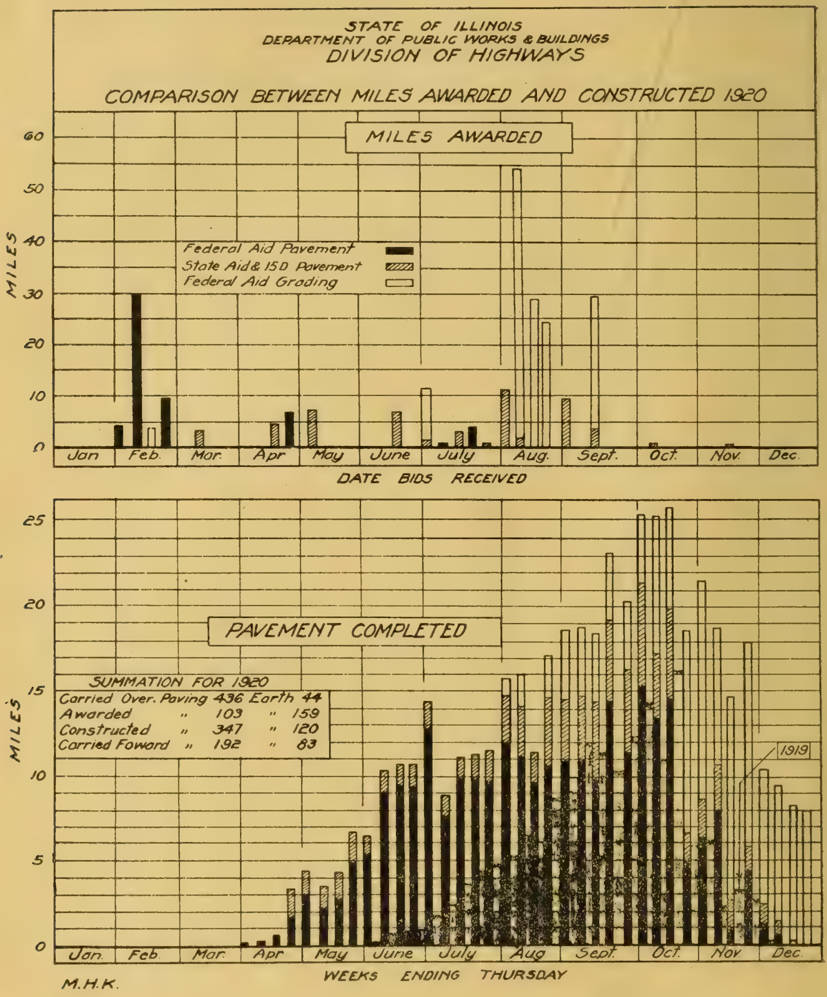


Spring Creek Bridge on Beardstown Road near Springfield. Reinforced concrete through girder design, two spans at 50 feet each. Completed 1921. Contract price $17,082.14.

standard plans which may be used where the conditions at the site will permit. These plans are made on sheets measuring 21x27 inches between margin lines, and from the tracings, zinc etchings are prepared having a scale exactly one-half that of the original drawings. This reduction in size of plan results in a material saving in blue print paper, and the fact that the same plan may be used at several bridge sites, results in a saving of time in office work.



These standards are revised from time to time as required to bring them up to date. At the present time the department is redesigning an entire new set of standard plans. These plans will include designs for structural steel bridges, reinforced concrete slab and through girder bridges and box culverts. The structural steel bridges are designed for a range in span from 50 feet to 200 feet, and for roadways of 16, 18 and 20 feet in width; the reinforced concrete through girder bridges are designed for a range in span from 30 to 60 feet, and for roadways of 16, 18 and 20 feet in width; the reinforced concrete slab bridges are designed for a range in span from 10 feet to 30 feet, and for roadways of 16 to 30 feet in width; the box culverts are designed for a range in



Carried Over.	Paving	436	Earth	44
Awarded	"	103	"	159
Constructed	"	347	"	120
Carried Foward	"	192	"	83

span from two feet to 12 feet, and roadways from 16 feet to the maximum width necessary.

BUREAU OF CONSTRUCTION.

The duties of the Bureau of Construction are:

To supervise the construction of all State road and bridge work, including all work done by the counties under section 15d of the Road and Bridge Law. The bureau also supervises all day labor construction and the distribution of all crushed stone from the two penitentiaries.

Construction from July 1, 1920, to January 1, 1921, was seriously handicapped on account of unsettled conditions. Material and equipment prices were very high and railroad transportation very irregular. Labor prices were high and most of the labor very inefficient. The 1920 construction program was, therefore, very much retarded.

Construction during 1921 opened in the early spring months with very unsettled conditions. However, by the first of May conditions became settled; there was a surplus of labor and it was very efficient. This materially reduced the material and equipment prices and improved railroad transportation conditions. The entire year was, therefore, considered ideal for construction work; in fact, most all prices on material and labor had returned to the pre-war basis.

During 1921 two large day labor construction units were organized, chiefly to ascertain construction costs and to utilize some of the surplus war equipment allotted to Illinois. The day labor work proved very satisfactory and additional units will be organized for next year's work.

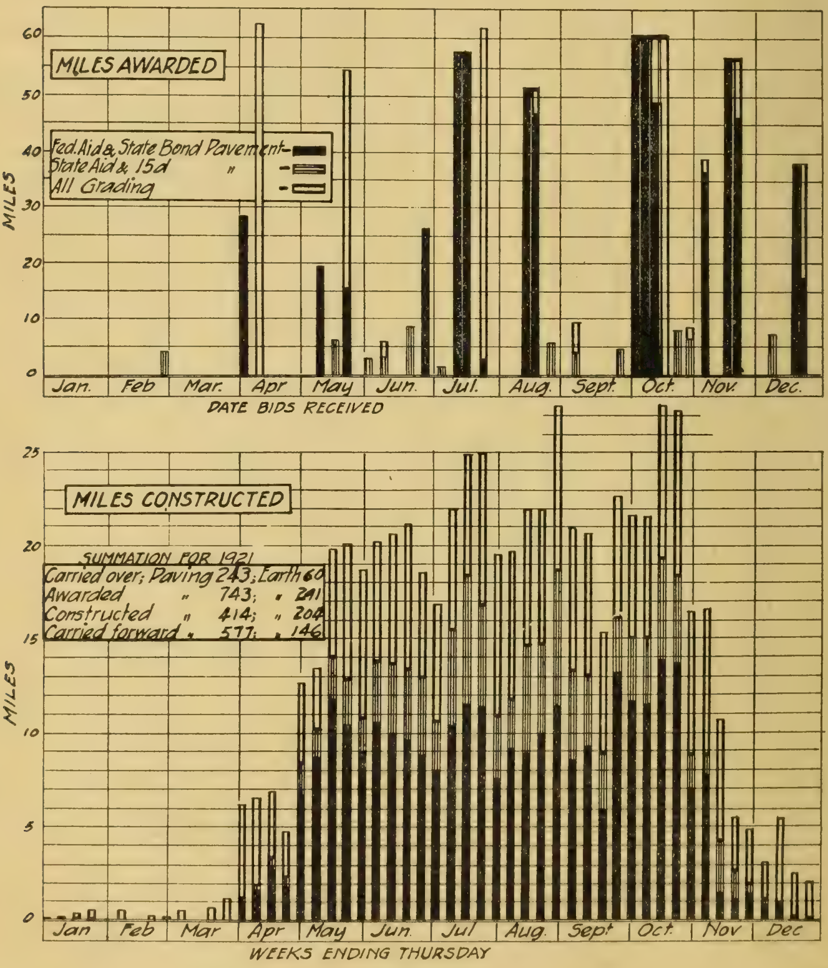
During 1921 there were employed by all contractors doing road, bridge and grading work approximately 7,500 men and 1,500 teams. This does not take into account the labor employed in the preparation of material, equipment, etc., that is used on road work.

On account of the shortage of cement and railroad transportation equipment during the year 1920 and the early part of 1921, the State considered it advisable to store a large amount of cement to prevent delays. The State purchases all cement for contractors and is, therefore, responsible for delays on account of non-delivery. It therefore stood a large percentage of the cost of the storage of the cement. During 1919, 1920 and 1921 there were stored 289,824 barrels at a cost of $58,228.75, or 20 cents per barrel. During 1921 practically no cement was stored as it was possible to get cement on the work with practically no delay.

During 1921 there was a very noticeable increase in the efficiency of all paving contractors. There were fewer paving mixers working during 1921, but a considerable increase in output was obtained. The following information is given to show some of the records made by paving contractors during 1921:

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

COMPARISON BETWEEN MILES AWARDED AND MILES CONSTRUCTED 1921



DAY RECORD.

W. F. Smith & Co., on June 16 laid 1,434 feet, 2,549.3 square yards. Single shift.
Jansen & Schaefer, on Aug. 24 laid 1,347 feet, 2,505.8 square yards. Double shift.
Fred C. Nelson, on Sept. 24 laid 1,305 feet, 2,610.0 square yards. Double shift.

WEEK RECORD.

Fred C. Nelson, Sept. 23 to 29, laid 4,878 feet, 9,756 square yards. Double shift.
Jansen & Schaefer, Aug. 18 to 25 laid 5,780 feet, 10,275 square yards. Double shift.

The best week's record for all contractors in the State was for the week ending October 20, when 19.35 miles were completed.

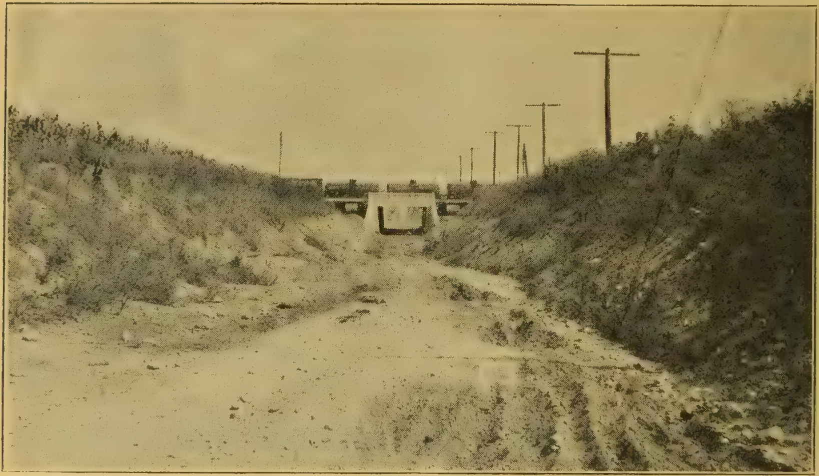
SEASON'S RECORD.

	Pavement laid in ft.	Mixer days.	Output.
R. F. Conway Co.	147,135	234	404
James O. Heyworth	88,185	187	471
Jansen & Schaefer	77,794	131	593*
Fred C. Nelson	23,577	39	604*
Alan J. Parrish	73,890	130	568
Powers & Thompson	71,673	157	456

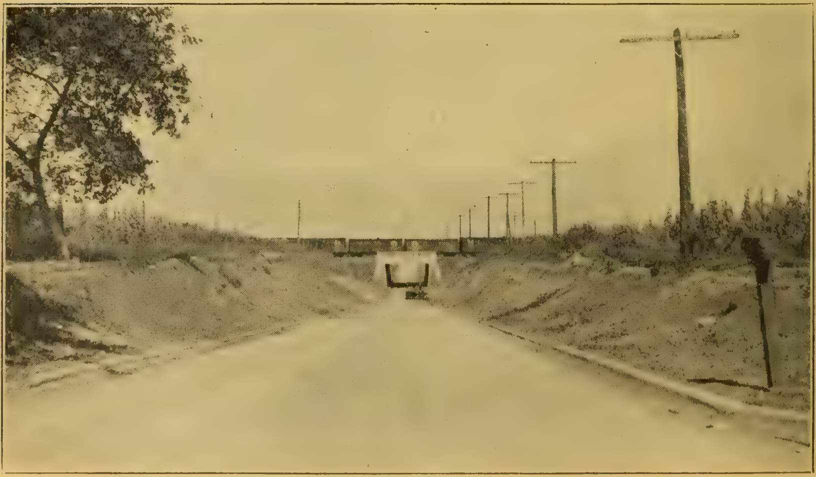
* Mixer was worked on double shift part of the time.

CONSTRUCTION METHODS AND WORK DONE.

Methods and items of work.	July to Dec. 1920.	Jan. to Dec. 1921.
PAVING.		
Number of paving contractors	90	111
Number of paving mixers operated	126	102
Mixers operated by—		
The use of industrial hauling equipment	27	20
The use of trucks delivering batches from a central proportioning plant to the paver	23	34
The use of central mixing plants hauling the mixed concrete in trucks	10	12
The use of trucks or industrial eqiupment hauling material from large storage piles	9	8
Material stored on subgrade	57	28
BRIDGES.		
Number of bridge contractors	35	54
Number of bridges completed	14	55
GRADING.		
Cubic yards earth moved	745,830	3,350,000
Total number of independent paving, bridge and grading contracts	273	492



Showing grade separation on Federal-aid road north of Chillicothe before paving.



Showing grade separation under the Santa Fe Railroad north of Chillicothe after paving.

BUREAU OF TESTS.

Active growth during the past 18 months has been noted in all branches of work conducted under the charge of the Bureau of Tests. Methods of inspecting materials have progressed to such an extent that it was possible during the past year to inspect over a million cubic yards of concrete aggregates, approximately a million and a quarter barrels of cement and over five million pounds of reinforcing steel to the satisfaction of all concerned. Investigational work which was begun on a moderate scale early in 1921 has now become one of the most important branches of work carried on by this bureau, and has helped place the laboratory in the leading ranks of highway laboratories in the United States.

From July 1, 1920, to January 1, 1921, inspection of cement and concrete aggregates was made at 9 cement mills and 67 aggregate plants. In all cases the materials were inspected before shipment was made, which insured no rejections at the construction site. The placing of inspectors at aggregate plants was begun in the early part of 1920 and proved exceedingly satisfactory during that year.

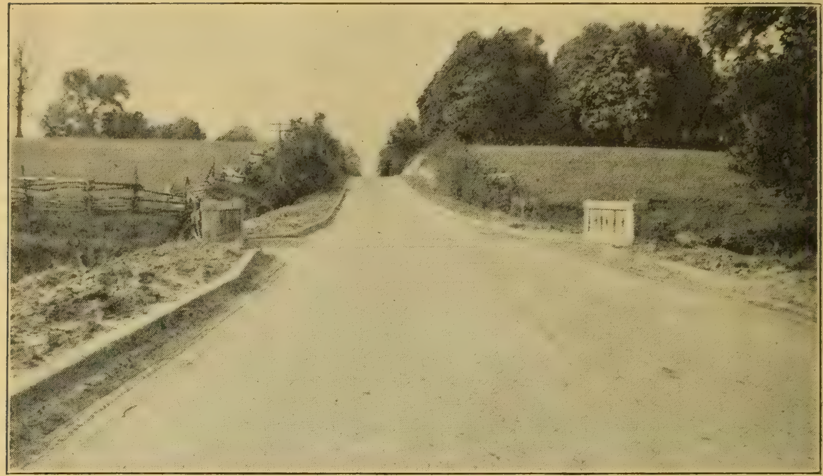
The branch laboratories established at the different cement mills were under the supervision of Junior Testing Engineers, who carried out 24-hour tests before accepting or rejecting the product. Final tests were made at the main laboratory on all material shipped. During the period noted above about 874,970 barrels of cement were tested at a cost of 1.84 cents per barrel.

Thirty inspectors were maintained at the different aggregate producing plants, and from July 1, 1920, to January 1, 1921, inspected approximately 400,000 cubic yards of material, performing tests for sieve analysis for graduation, clay content, and soft material content. This inspection was maintained at a cost of 5.6 cents per cubic yard.

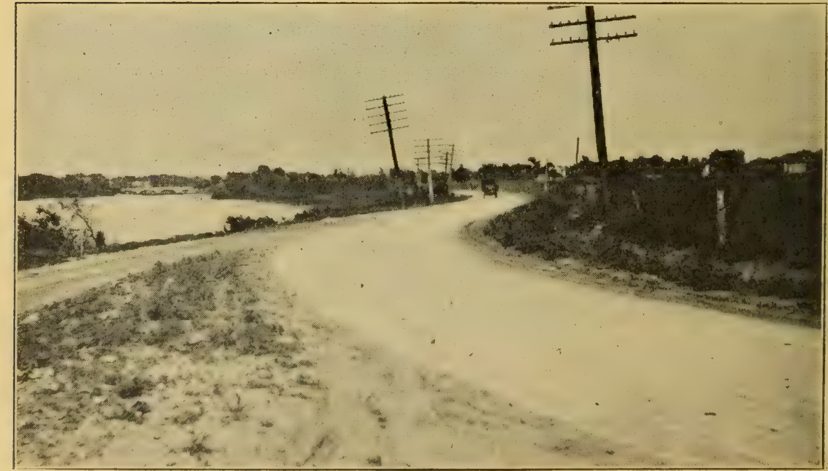
An estimate on the cost of inspecting the material used in concrete pavements showed that the inspection cost in 1920 was 0.7 per cent of the construction cost.

Besides the plant inspection of cement and aggregates, the bureau maintained inspection at several paving brick plants and creosoting works. A field laboratory in charge of a chemist was also maintained at Deerfield, Illinois, for the purpose of making an analysis and inspection of asphalt and other materials used in the construction of approximately eight miles of asphaltic concrete on the Chicago-Milwaukee Highway.

The main laboratory was called upon to test practically every type of material used in highway and bridge construction work. Tests were made on paving brick, gravel, rock, cement, road oils, tars, paints, asphalts and numerous other materials. In connection with the Bates experimental road, the laboratory made extensive surveys of the materials used, preparing specimens for test at the time of construction and also



Showing gutter sections through deep cuts. The curbs prevent wash and make road safer for traffic.



Completed pavement on Dixie Highway showing easy curves.

for future tests. Tests were also made on samples submitted by the State Geological Survey.

In 1921 inspection of materials was made in a similar manner as in the preceding year, although on a much larger scale. The materials from a greater number of plants were taken care of, and the number of inspectors placed at production plants was increased considerably. In the preceding year one inspector was called upon to inspect the material from five or six plants. Though this method had proven satisfactory, it was thought that every chance of error could be eliminated if the range of activities of the inspectors was lessened. For this reason and also because greater amounts of materials were offered for inspection, inspectors were stationed at almost every plant furnishing materials for Illinois highways. Some inspectors handled the material from several plants, but this was the case only when the plants were situated near each other. District Testing Engineers who were placed over a certain number of plants, were held responsible for the work of the inspectors in their respective districts, and settled small troubles in quick time thus promoting a better feeling with the materials producers.

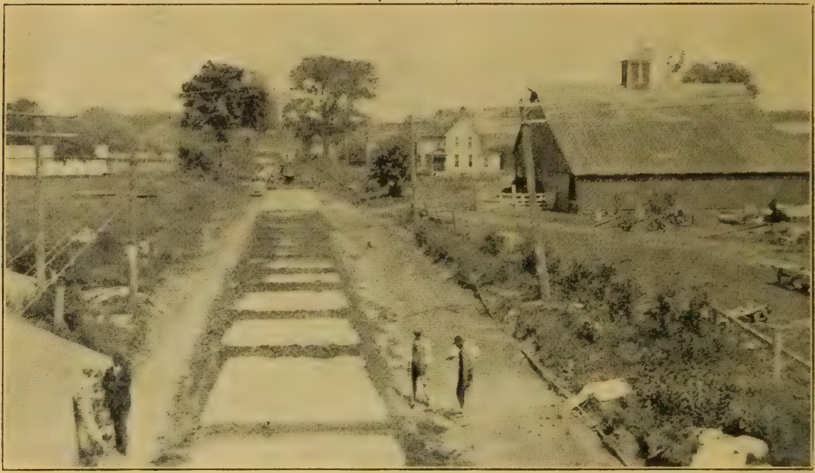
During the past year over 1,275,000 barrels of cement were tested by this department for use in construction of Illinois pavements and bridges. This amount includes the 139,000 barrels of winter stored cement which was tested in the main laboratory. Partial tests were made on 309,232 barrels of cement from Illinois mills for the Iowa State Highway Commission, the cost of the inspection being borne by the Iowa Highway Department. The inspection of cement for the Illinois Division of Waterways was also undertaken this year by the Bureau of Tests, and amounted to 6,835 barrels.

Estimates of the cost of inspection of cement during the past year show a reduction in cost over the preceding year. Figures indicate that during the past year the cost of inspecting cement was 1.68 cents per barrel, whereas in 1920 the cost was 1.84 cents per barrel.

Aggregate materials from 82 plants received at various times during the year were inspected by a force of 45 inspectors. Over 1,010,000 cubic yards of concrete aggregates were taken care of by these inspectors at an average cost of 6.6 cents per cubic yard.

Plant inspection of cement and concrete aggregate proved so successful that the same method of inspection for steel was adopted in the spring of 1921. Over five million pounds of reinforcing steel were inspected during the year, more than four-fifths of this amount being inspected at the steel mills.

Figures compiled for the year 1921 show that the cost of inspection of concrete materials amounts to .83 per cent of the construction cost, considering the cost of constructing a mile of concrete pavement as $28,000. Though the percentage has advanced .13 per cent over that



Showing method of building and curing concrete pavement on Lincoln Highway.

Showing finished pavement on Lincoln Highway.

of 1920, the advancement is due more to the drop in construction costs than to the increased cost of inspection.

Due to the efficient field inspection in 1921, the main laboratory was not called upon to do as much testing of sand, gravel and stone as in preceding years. However, check tests on cement; quality tests on materials from all plants producing aggregates for use on Illinois highways; and the hundreds of samples of oils, paints, asphalts, tars and other such materials did not permit a change in the laboratory force. Over a thousand samples of road oils were tested during the year, the Bureau of Tests cooperating in every respect with the counties and townships in their efforts to get the best of oils for their roads.

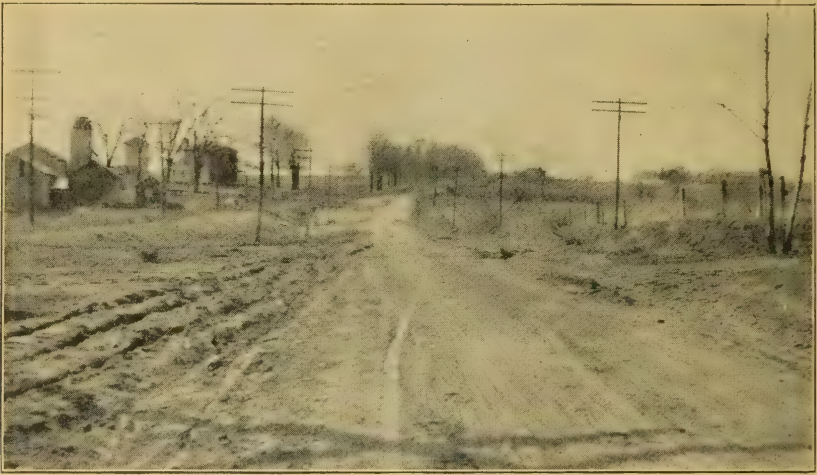
Investigational work began on a large scale in 1921, and the results of many of the experiments will probably have a bearing on the specifications dealing with future highway construction in this State. An idea of the investigations which were carried out during the past year is given by the following list of experiments:

1. Fatigue of concrete.
2. Curing of concrete.
3. Setting of concrete under low temperatures.
4. Curing of concrete under low temperatures.
5. Prevention of bond on rods in concrete.
6. Investigation of Earthcrete.
7. Investigation of Hard-N-Tyte.
8. Investigation of Super Cement.
9. Investigation of cement failing to pass specifications.
10. Investigation of Novaculite as concrete aggregate.
11. Comparison of slotted and plain cylinders in abrasion tests of stone.

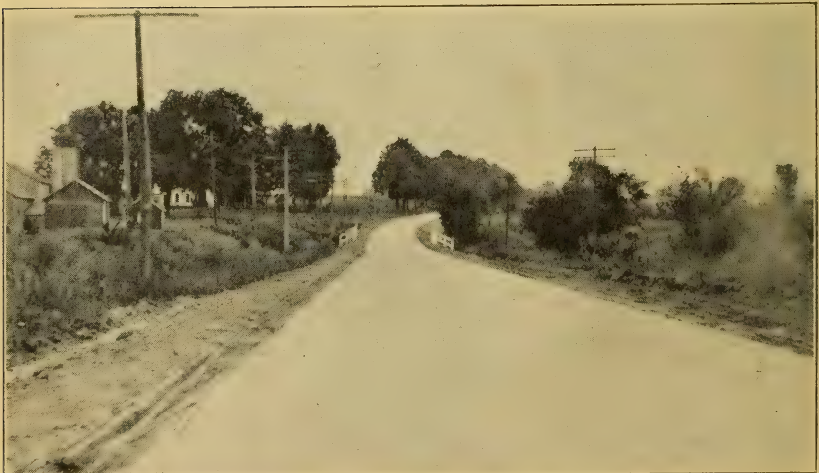
Investigational work was also conducted by the laboratory on the Bates Experimental Road. These experiments dealt with the action of pavements and subgrades under varying temperatures and loads. It is impossible to go into detail in this report regarding the work on the Bates Road, but the following list of experiments may give an inkling of the importance of this phase of investigational work:

1. Effect of repeated loads on different types of pavements.
2. Effect of repeated loads on concrete and concrete base pavements with subgrade excavated.
3. Measurement of distribution of loads on pavements.
4. Effect of temperature on different types of pavements.
5. Measurement of cracks in concrete pavements.
6. Measurement of conductivity of heat in concrete.
7. Measurement of rate at which frost penetrates through subgrade towards center of pavement.
8. Measurement of bearing power of soil under various loading.
9. Determination of moisture content of soil.
10. Effect of tile drainage.
11. Effect of freezing and thawing of soil.
12. Investigation of movement of pavement in relation to subgrade.
13. Investigation of movement of subgrade in relation to pavement.
14. Effect of winter curing on concrete.

With the huge construction program as outlined for 1922, the inspection work of the Bureau of Tests will be greatly increased. Approximate estimates on the amount of material which must be inspected



Condition of Lincoln Highway before paving.



Condition of Lincoln Highway after paving.

produces the astounding figure of 3,000,000 cubic yards of aggregates. The bureau will also be called upon to inspect the materials used in maintenance work as well as the material which will go into the construction of the Illinois waterway.

Besides the inspection work to be done in 1922, the Bureau of Tests is arranging a large investigational program. One of the most important of experiments which will be conducted is the one pertaining to gradation of materials. This investigation is to be made in an effort to arrive at a suitable concrete with the use of smaller aggregate. The result of this experiment may mean that double the amount of aggregates now permissible by present specifications can be used in future construction.

BUREAU OF MAINTENANCE.

The law provides that all hard-surfaced roads built under the State-aid, Federal-aid and Bond Issue laws shall be maintained by the Division of Highways. It also provides that the county shall pay one-half of the maintenance cost on such types as asphaltic concrete on macadam base, bituminous macadam, water bound macadam and gravel, and that the county shall bear the entire expense and have maintenance supervision over earth and oiled earth roads built by State-aid.

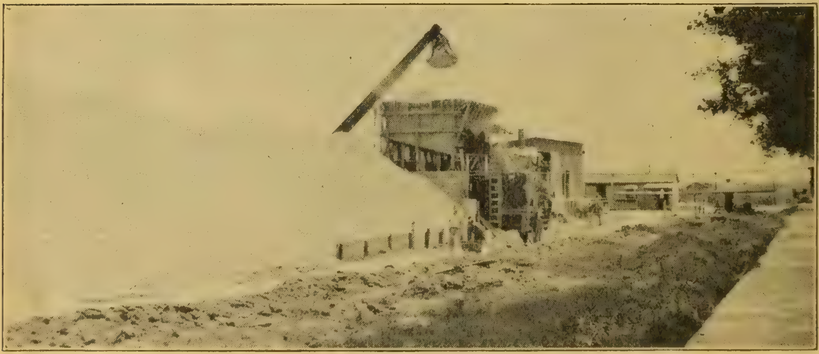
The maintenance of all State highways, for which the State is responsible, is now carried on by means of the patrol system, supplemented by a few outfits working under the gang system. This work is divided into sixty patrols with an average of about twenty miles to the patrol. The patrolman is furnished with a truck and other necessary equipment and is responsible for the condition of his patrol to which he is required to give his entire time.

The following tables show the maintenance cost for accepted mileage based on an 18-foot width of pavement:

JUNE 30, 1920, TO DECEMBER 31, 1920.

Type.	*Miles.	**Cost per mile based on an 18 ft. pavement.	Average cost per sq. yd.
Brick	100.10	$ 309 55	.20932
Concrete	734.80	277 61	.02628
Bituminous macadam	25.19	193 26	.01830
Water bound macadam	28.91	1,682 49	.15932
Gravel	47.70	480 27	.04547
Earth and oiled earth	566.99	44 87	.00425

Dwight day labor job where war equipment was used in building 7¼ miles of 18-foot concrete pavement.



Frankfort day labor job where war equipment was used in building 6¼ miles of 18-foot concrete pavement.

JANUARY 1, 1921, TO JUNE 30, 1921.

Type.	*Miles.	**Cost per mile based on an 18 ft. pavement.	Average cost per sq. yd.
Brick	152.24	$136 54	.01293
Concrete	1,081.49	52 80	.00500
Bituminous macadam	24.92	19 22	.00182
Water bound macadam	27.22	15 84	.00150
Gravel	47.87	21 23	.00201
Oiled earth	120.78	29 36	.00278
Earth	418.49	96 52	.00914

NOTE.—The above figures include the cutting of weeds and vegetation, cleaning of ditches and drains and maintenance of pavement.

Depreciation charges on equipment are not included for the period of January 1 to June 30, 1921.

* It should be understood that the schedule of mileage given in this table is the total mileage of roads of the different types maintained during the fiscal year regardless of widths.

** The schedule showing cost per mile shows the actual cost per mile of an 18-foot road having the same surface area as exists in the total miles of pavement of each type.

BUREAU OF MACHINERY.

The Bureau of Machinery was organized in July, 1919, for the purpose of receiving and taking care of the surplus war materials received from the government. The organization of nine employes has been increased as the scope of work became greater. At the present time forty employes are required to do the work for this bureau. The mechanical repairs on equipment located in and adjacent to this city are made in a garage which is a part of this organization noted above. The storage of repaired cars, trucks and surplus materials received from the government is carried on as a part of this organization; and the storage buildings are located at the State Fair Grounds, Springfield.

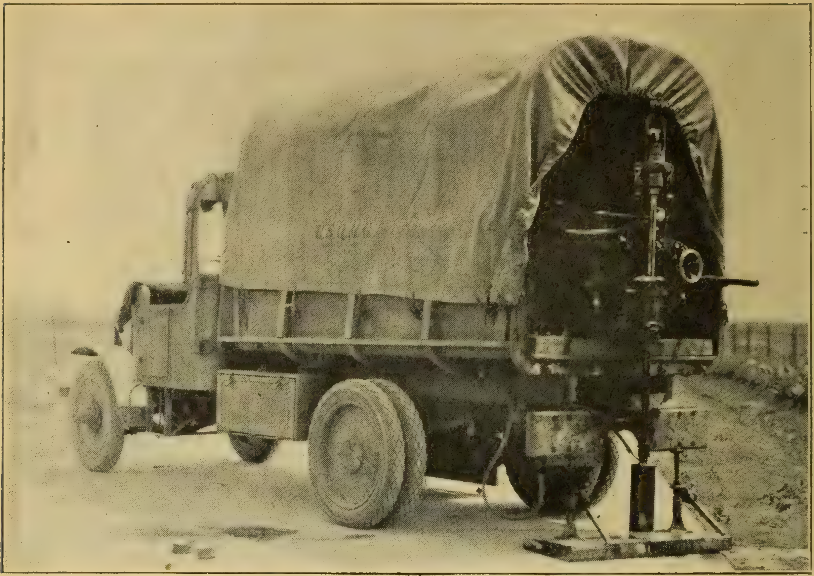
The supplies received from the United States Government are being used for road building and improvement of the highways. Some of the more important items received and being used are:

Asphalt plant.
Asphalt kettles.
Boilers (steam).
Buckets (clam shell and orange peel).
Cars (steel, flat and side dump).
Cranes (locomotive).
Derricks (stiff leg).
Engines (hoist and swinging).
Forges (portable).
Graders (blade).
Locomotives (24 and 36-inch gauge).
Mixers (1 and 8 bag).
Pipe (water).
Pumps.
Plows.
Railroad rail (industrial).
Rollers (10-ton).
Scrapers (wheel and slip).
Trucks (automobile, 1 to 6-ton).
Trailers.
Wagons (sprinkling and dump).

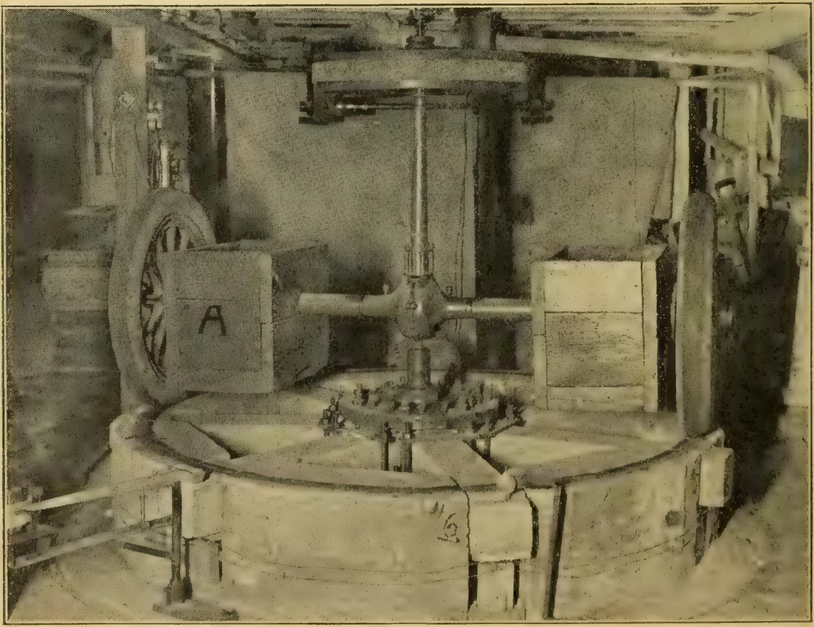
A large number of motor trucks of various makes and sizes were placed out for rental as follows:

June 30, 1920, to Jan. 1, 1921.
115 Trucks to contractors.
95 Trucks to institutions.
256 Trucks to counties.
112 Trucks to highway bureaus or districts.

Jan. 1, 1921, to Dec. 31, 1921.
40 Trucks to contractors.
100 Trucks to institutions.
275 Trucks to counties.
130 Trucks to highway bureaus or districts.



Core drill used to remove cylindrical specimens from pavements; allows careful inspection of quality and thickness of concrete. Specimens are tested for compressive strength.



Machines used in experiments in "fatigue concrete." Loads are applied to beams by the wheels, which revolve. The number of applications of load is registered and at the rupture of a beam the machine automatically stops.

The reader's attention is called to the number of passenger cars received from the Government and their estimated value to the State of Illinois in construction and maintenance of the highways.

PASSENGER CARS IN SERVICE.

June 30, 1920, to Jan. 1, 1921.	Jan. 1, 1921 to Dec. 31, 1921.
57 Cars in service.	108 Cars in service.
$59,850.00 represents estimated service value of cars at $7.00 per day.	$226,800.00 represents estimated service value of cars at $7.00 per day.

The Division of Highways was in possession of a small amount of machinery before the surplus war materials were received from the Government. The estimated commercial value of the various pieces of machinery, repair parts, etc., received from the United States Government may be given as follows:

June 30, 1920, to Jan. 1, 1921.	Jan. 1, 1921, to Dec. 31, 1921.
$3,019,764.22.	$1,509,882.10.

Total value to date—$4,529,646.32.

The State of Illinois has received material benefits either by cash receipts or estimated rental value, and the following statement in regard to receipts and expenditures are made upon this basis:

June 30, 1920, to Jan. 1, 1921.		Jan. 1, 1921, to Dec. 31, 1921.	
Cash items	$ 38,718.74	Cash items	$ 53,188.72
Non-cash items	....	Non-cash items	24,292.50
Miscellaneous items	404,174.38	Miscellaneous items	951,191.20
Total income for Bureau of Machinery	$442,893.12	Total income for Bureau of Machinery	$1,028,672.42
Expense in handling, storage, shipping and maintaining equipment	142,613.20	Expense in handling, storing, shipping and maintaining equipment	294,067.22
Leaving as a net operating profit for Bureau of Machinery	$300,279.92	Leaving as a net operating profit for Bureau of Machinery	$734,605.20

In going through the records, it could be assumed from the data at hand that at least 50 per cent of the surplus materials are used in various ways in the building and maintenance of the State highways. Other materials are being used by the various State institutions and departments in road building improvements in and about the institution premises.

BUREAU OF AUDITS.

STATEMENT SHOWING THE CONDITION OF APPROPRIATIONS FOR THE PERIOD BEGINNING JULY 1, 1920, AND ENDING DECEMBER 31, 1920.

FIFTY-FIRST OMNIBUS APPROPRIATION.

Overdraft June 30, 1920	$ 651.41
Available July 1, 1920	95,690.00
Total available July 1, 1920	$95,038.59
Expended July 1, 1920, to December 31, 1920	47,498.70
Balance available December 31, 1920	$47,539.89

STATE AID APPROPRIATION.

Balance available June 30, 1920	$500,160.41
Available July 1, 1920	300,000.00
Total available July 1, 1920	$800,160.41
Expended July 1, 1920, to December 31, 1920	338,804.41
Balance available December 31, 1920	$461,356.00

FEDERAL AID APPROPRIATIONS.

Made from Road Fund 1917-1918	$ 1,326,000.00	
Made from Road Fund 1919-1920	14,500,000.00	
Total State funds appropriated		$15,826,000.00
Made from United States Government allotments:		
Total allotment	$12,024,266.96	
Less cash not received	6,675,188.99	
Total allotment received in cash		5,349,077.97
Total available appropriations		$21,175,077.97
Less expenditures to December 31, 1920		15,277,477.62
Balance available December 31, 1920		$5,897,600.35

NOTE.—The item "Cash Not Received" represents the amount which will be due the State from the United States Government upon final completion of existing projects. No payments are made by the United States Government until the work is actually completed and paid for by the State.

STATEMENT SHOWING THE CONDITION OF APPROPRIATIONS FOR THE PERIOD BEGINNING JANUARY 1, 1921, AND ENDING DECEMBER 31, 1921.

FIFTY-FIRST OMNIBUS APPROPRIATION.

Balance December 31, 1920	$47,539.89
Available July 1, 1921	....
Total available July 1, 1921	$47,539.89
Expended January 1, 1921, to September 30, 1921	40,735.46
Lapsed October 1, 1921	$6,804.43

FIFTY-SECOND OMNIBUS APPROPRIATION.

Available July 1, 1921	$96,750.00
Expended January 1, 1921, to December 31, 1921	56,554.81
Balance available December 31, 1921	$40,195.19

STATE AID APPROPRIATION.

Balance December 31, 1920	$461,356.00
Available July 1, 1921	....
Total available July 1, 1921	$461,356.00
Expended January 1, 1921, to December 31, 1921	248,088.68
Balance available December 31, 1921	$213,267.32

STATE HIGHWAYS APPROPRIATION.

Available July 1, 1921	$20,000,000.00
Expended January 1, 1921, to December 31, 1921	4,526,651.22
Balance available December 31, 1921	$15,473,348.78

STATE BOND APPROPRIATION.

Available July 1, 1921	$4,709,477.78
Expended January 1, 1921, to December 31, 1921	2,469,000.65
Balance available December 31, 1921	$2,240,477.13

HIGHWAY MAINTENANCE APPROPRIATION.

Available July 1, 1921	$3,000,000.00
Expended January 1, 1921, to December 31, 1921	225,737.08
Balance available December 31, 1921	$2,774,262.92

COUNTY REFUNDS APPROPRIATION.

Available July 1, 1921	$6,758,672.10
Expended January 1, 1921, to December 31, 1921	719,273.18
Balance available December 31, 1921	$6,039,398.92

NOTE.—The amount shown as available July 1, 1921, as State bond appropriation of $4,709,477.78 is the amount derived including accrued interest from the sale of $5,000,000.00 of State highway bonds.

FEDERAL AID APPROPRIATIONS.

Made from Road Fund 1917-1918	$ 1,326,000.00	
Made from Road Fund 1919-1920	14,500,000.00	
Total State funds appropriated		$15,826,000.00
Made from United States Government allotments:		
Total allotment	$12,024,266.96	
Less cash not received	3,235,192.75	
Total allotment received in cash		8,789,074.21
Total available to September 30, 1921		$24,615,074.21
Less expenditures to September 30, 1921		23,059,668.70
Lapsed October 1, 1921		$1,555,405.51

NOTE.—The item "Cash Not Received" represents the amount which will be due the State from the United States Government upon final completion of existing projects. No payments are made by the United States Government until the work is actually completed and paid for by the State. The amounts received from the United States Government after October 1, are deposited in the road fund from which the new appropriation called "State Highway" is payable.

The amount shown as lapsed on October 1, 1921, is merely a "book lapse" since same is taken up in the new "State Highway Appropriation."

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FIFTH ANNUAL REPORT

OF

The Department of Public Works and Buildings

Division of Highways

January 1, 1921

TO

December 31, 1922

AUG. 26TH 1818

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C. R. MILLER, Director
FRANK T. SHEETS,
Superintendent of Highways
CLIFFORD OLDER,
Chief Highway Engineer

[Reprinted from the Fifth Administrative Report. Printed by authority of the State of Illinois.]

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DIVISION OF HIGHWAYS.

FRANK T. SHEETS, *Superintendent of Highways.*
CLIFFORD OLDER, *Chief Highway Engineer.*

The year 1922 has been the greatest in the highway history of Illinois. Its close brought a climax to Illinois road building activities when the world's record for the amount of durable, hard-surfaced pavements laid by any state in any one year was broken by the completion by Illinois of 741 miles of road. Of this mileage, 701 miles consisted of concrete or equal hard-surfaced types of pavement, and 40 miles consisted of macadam or gravel. Of this total mileage, 547 miles lay directly on the bond issue system and 194 miles were State aid roads constructed by the counties under the supervision of the State Division of Highways. The volume of this work becomes apparent when it is remembered that the total production of hard roads in Illinois in 1921 was only 414 miles.

At the peak of the construction season, the road production rate reached the high mark of 41 miles per week. Had it been possible to maintain this high rate of production throughout the entire season, a much greater total mileage for the year would have been produced. However, on account of the coal strike, the rail strike, the car shortage, and the priority orders of the Interstate Commerce Commission, road work was greatly curtailed at the middle of the season when weather conditions were most favorable. When other states were practically shutting down their road construction activities, Illinois went courageously on and made this enviable record in the face of almost insurmountable obstacles.

While the year has been marked by this great increase in completed milage, it has also been distinguished by the fact that the quality of pavements produced has excelled even that of the pavements built in the past years. This increase in quality has been due to closer cooperation upon the part of road builders, to the improvement in construction methods and machinery and to the general advance in the science of road building. The most rigid enforcement of the specifications and the strictest inspection of construction have been the rule, and every effort has been made to build the highways in the best possible manner. The importance of the smoothness of the pavement surface has become more and more apparent, and this phase of construction has been given especial attention by both the engineers and contractors with remarkably good results.

In the report of 1921, reference was made to the investigational and research work which has been undertaken by the division. With the expenditure of large sums of money for highway construction a commonplace occurrence, it became very apparent that scientific study should be made to be sure that the pavements constructed would be so designed as to carry safely the heaviest traffic permitted by law. Accordingly, the Bates experimental road, approximately two miles in length, consisting of sixty-three different sections, embodying all types and thicknesses of the standard pavement materials such as concrete, brick, and asphalt, was built, and during the year 1922 was subjected to a traffic test. Motor trucks, which were increased in weight in successive stages from the lightest commercial vehicles to the heaviest permitted by law, were run over this highway, and it is pleasing to note that the standard designs used by the department came through this incessant hammering of the heaviest traffic without a flaw.

The construction of this test road and the investigational work carried on in connection therewith has resulted in changes of design which have not only greatly increased the strength of the pavements built but have also resulted in a marked saving in cost. The total saving on the contracts which have been let for pavements on the revised designs resulting from this traffic test has already amounted to approximately $3,300,000.00.

This Bates test road, however, has shown conclusively the absolute importance of rigidly enforcing the legal load limits. It has been clearly demonstrated that a highway which would be perfectly safe for an indefinite period under the legal load could easily be reduced to ruins in a few months should this legal load be greatly exceeded. In certain districts of the State, much damage to pavements was done through gross overloading of motor trucks. In some instances, loads as great as twice that permitted by law were operated on the highways and wrought great havoc. However, the Fifty-second General Assembly passed legislation which permitted the Department of Public Works and Buildings to establish a police force composed of State highway patrol officers who have power to enforce the provisions of the motor vehicle law. This force has been established and has been in operation for the greater portion of the year. The officers have been uniformed and equipped with motorcycles with side car attachments and with accurate weighing devices.

These officers have been stationed especially in those districts where violation of the legal load limits was the common occurrence. Many trucks have been weighed, many arrests made, and as a result the practice of over loaded trucks has been practically stopped in this State.

These officers have also enforced the other regulations of the motor vehicle law, and although they have carried out the mandates of the people as expressed in our motor vehicle laws, they have, at the same time, done so with unfailing courtesy and with the spirit of affording assistance to the general traveling public.

During the year, all of the completed highways have been carefully maintained. Any minor defects which occur are immediately remedied, and maintenance patrolmen have been equipped with the proper machinery and given immediate supervision of sections of highway with the result that the investment which the people of Illinois have made and wil make in roads has been carefully safeguarded by adequate and thorough maintenance.

The maintenance forces have also placed down the center line of all State highways a black line approximately four to six inches in width which is intended to serve as a traffic guide keeping vehicles to the proper side of the road, and insuring their passing each other safely. This practice has caused the most favorable commend from the users of the highway, and has come to stay as one of the desirable features of Illinois roads.

The carrying on of the great construction activities of the State has necessitated proper financing. During the year all surplus motor fees have been used for highway construction or maintenance. Upon the exhaustion of these fees, State highway bonds have been sold, but the department has adhered rigidly to the rule of selling these bonds only as the money was actually needed for construction. The bonds which have been sold have been most favorably received by the leading financial institutions of the United States and have been declared by some of the leading financiers as being the most desirable public improvement bonds offered on the market of the country during the year. This indicates clearly the confidence which the banking and financial world reposes in the business methods of the present administration, and reflects great credit on the financial stability of our State.

ROAD BOND SALES.

Date of sale.	Amount sold on each series.	Amount realized from the sale.	Sale rate.	Interest yield.
October 25, 1921	$5,000,000	$4,701,000	$94.02	4.85%
April 13, 1922	6,000,000	5,932,500	98.875	4.11%
September 18, 1922	6,000,000	5,981,280	99.688	4.04%

In addition to the work carried on directly by the department, county highway work has attained a degree of progress never before experienced in the history of Illinois. The passage of the State highways act which provided that the counties should take over and maintain the uncompleted State aid roads of the county, levying for this purpose a special county highway tax, has wrought great results. In those counties where a cheerful compliance with the spirit of this law was the rule, the people have enjoyed greater highway service than has ever before been experienced. It has been clearly demonstrated that county maintenance of important county or State aid roads is the logical form of highway administration, and it is to be hoped that the future will bring about the strengthening of the present law pertaining to this subject, and also a cheerful compliance with the law on the part of all the county boards of the State.

In the following pages will be found a detailed report of the various bureaus of this division. On account of the fact that the work of this division naturally arranges itself by calendar years, all statistical information is based on the calendar year of 1922.

SCIENTIFIC RESEARCH WORK—BATES TEST ROAD.

The completing and testing of a series of sections of pavements presumed to include practically all of the types ordinarily considered as suited for modern traffic conditions was undertaken by the Department of Public Works and Buildings, Division of Highways, of Illinois, to determine insofar as might prove practical the best and most economical types for a trunk line system of highways in the State. Inasmuch as, when the building and testing of the road was decided upon, the State had under contemplation the expenditure of about one hundred million dollars for trunk line roads, it was hoped that the results of the tests might be of great benefit to Illinois.

In the plan of the various sections and in the scheme of testing, it was held in mind that as much information should be obtained as possible looking forward to the determination of the fundamental principles governing the design of payments of any of the general types included in the tests, so that hereafter, knowing the general conditions applying at points where pavements were to be laid, the fundamental laws thus obtained might enable a designer confidently to plan a pavement suitable to such general conditions. The test was also planned in such a way that, failing in the aim to uncover the general laws, empirical or "rule of thumb" data would still be available for the same purpose.

A total of 63 sections were built, grouped in six general types as follows:

Brick wearing surface on macadam base.
Asphaltic concrete on macadam base.
Asphaltic concrete on concrete base.
Brick with bituminous joint filler on concrete base.
Brick with cement grout joint filler on concrete base (so-called monolithic brick construction).
Single course concrete.

Each group consisted of a series of sections of gradually increasing load-carrying capacity, beginning with a section presumed to have a supporting capacity sufficient for the lightest traffic units that might be expected on a trunk line road, and ending with a section presumed to have a load-carrying capacity sufficient to support the heaviest traffic units that might be expected on a trunk line road.

The construction of the Bates Test Road was started in the summer of 1920 and finished early in 1921.

The testing was divided into two phases: First, detail, carefully controlled, research work looking forward to a determination of the fundamental laws governing the load supporting capacity. Second, testing by means of artificial truck traffic, the trucks starting with a minimum load which was increased after each 3,000 round trips until the maximum load was imposed—four tons on each rear wheel of each truck.

The detail research work included many thousands of observations, such as the determination of the moisture content of the soil under the various sections of the road at weekly intervals for a period of more than two years; a determination of the load supporting capacity of the soil under stationary, moving and repeated loads; the pressure imposed upon the soil underneath the road surfacing by both fixed and moving wheel loads applied to the surface; the deflection and deformation of the road surface under both stationary and moving wheel loads; correlated laboratory work on the strength of the various elements entering into the construction of the different sections; the effect of varying proportions; systems of drainage; systems of reinforcement in concrete slabs, etc.

Before the completion of the originally planned tests, the preliminary work suggested the desirability of a special design for concrete slabs. One section of this design was built in the spring of 1921 and tested with the remainder of the road in 1922. The preliminary work also developed many interesting and important matters relating to the design and construction of pavements, which cannot be here detailed. The most outstanding feature of this character perhaps relates to the inefficiency of tile drainage as related to such road slabs as form a practically impervious crust, it having been found that even with a tile drain immediately under each edge of the pavement and the trench back-filled with cinders, the moisture content of the subgrade soil was not reduced in any case below that which obtained under similar pavements without such tile drains. This development upset one of our most cherished traditions in regard to the construction of roads in flat country.

We discovered. as a result of the truck traffic tests, that in the macadam base types of pavement the total thickness of the paving material was not the most important factor governing the load-carrying capacity of the road. Other factors, such perhaps as the amount of moisture content in the subgrade soil when the pavement was laid, apparently had more influence on the load-carrying capacity than thickness alone, inasmuch as sometimes sections of this type having the greatest thickness failed earlier than other sections having a lesser thickness. Truck traffic tests on these groups of sections indicated also that the best of these sections was hardly equal to the weakest sections of pavement having concrete base, or composed entirely of concrete. The sections having concrete lases, or composed entirely of concrete, are generally called rigid types of pavement. The truck traffic tests showed unmistakably that in such pavements the load-carrying capacity is practically in proportion to the square of the thickness. In other words, a pavement composed of an 8-inch total thickness of concrete, or one having a concrete base 8 inches thick, might with reasonable safety be assumed to be four times as strong as a pavement having a 4-inch total thickness of concrete or a 4-inch concrete base.

The most important and far reaching development was that of the comparatively extreme weakness of the edges as related to the strength of the mid-portion of the slab. All sections of rigid types that showed any signs of failure, first failed along the edges, the breaking up of the remainder of the pavement being directly traceable to this initial failure. The determination of this fact led to a distinct and fundamental change in the design of concrete roads in Illinois. The total change was accomplished in two stages:

First—After the preliminary work was completed, the design was changed from an 8-inch uniform concrete pavement slab, without joints or embedded steel, to a 7-inch uniform thickness having a longitudinal center joint, the purpose of which was to control the location of the longitudinal crack which otherwise almost invariably occurs, and the placing of a continuous steel bar along each edge in order that the edges, particularly at corners formed by transverse joints or cracks, might be strengthened. The section of the original Bates Road built in accordance with this design sustained all of the truck traffic without damage. During the latter part of 1921, and until the fall of 1922, all paving contracts were awarded for concrete roads designed in this manner. This change in design, which was a development of the Bates Road tests, unquestionably increased the load carrying capacity of the pavement and at the same time reduced the first cost about sixteen hundred dollars per mile.

Second—Upon completion of the traffic tests in the summer of 1922, the design was changed to provide for further strengthening the edge of the pavement by increasing its thickness to nine inches. Inasmuch as the tests showed that the mid-portion of the slab was still stronger than necessary, the nine inches thickness in the present design tapers to six inches at a distance of two feet from the edge, the entire mid-portion being six inches thick. This change in design resulted in a further economy of more than twenty-one hundred dollars per mile under average Illinois conditions; and provides a road slab more balanced in strength than any previously used. Four sections of this type were added to the west end of the Bates Road in the fall of 1922, and will be tested by truck traffic in the spring of 1923. The loading will start with 8,000 pounds, on each rear wheel of the trucks, which is the maximum limit as provided by the Illinois statutes, and upon completion of a total of nine thousand or ten thousand round trips of the trucks under this increment, the loading will be increased until a 50 per cent overload has been attained.

It is entirely possible that the results of the future loading may warrant a third change in design—either to produce a pavement more nearly perfect in the balance of strength of its various parts, or one more economical in first cost of construction.

BUREAU OF DESIGN.

Between January 1, 1922, and January 1, 1923, the volume of work handled by the Bureau of Design very nearly doubled, because of the large construction program attempted, the department having in view the placing of enough work under contract to permit of the construction of 1,000 miles of pavement during the year of 1922. The total mileage and the estimated cost of road work for which surveys and plans were prepared under the direction of this bureau is larger than in any previous year. A large mileage of road work, which included pavement, heavy grading and separate bridge contracts, was awarded and plans for a large additional mileage have been competed and the work is ready for letting.

In addition to the work awarded directly by the State there has been a great increase in the amount of work awarded directly by the counties under the provisions of Section 15d of the Road and Bridge Act. Since all 15d work must have the approval of the Department of Public Works and Buildings, Division of Highways, it has been the duty of the Bureau of Design to investigate carefully all county plans, specifications, estimates and contracts prior to their approval. The volume of this class of work has increased to approximately four times the volume in the previous year.

The accompanying table shows the mileage and costs of all the various classes and types of work awarded during the year of 1922.

Because of the rapidly increasing mileage of highways under construction, a large number of railroad grade crossings are involved, making necessary the handling of all matters pertaining to separation of grades at railroad grade crossings before the Illinois Commerce Commission. The opening of new grade crossings and adequate protection of existing grade crossings, together with negotiations for separations of grades, has become one of the largest activities of this bureau. The Bureau of Design has charge of the preparation of the plans and estimates, the filing of petitions, carrying on negotiations prior to the hearing, representing the Department of Public Works and Buildings, Division of Highways, at all hearings before the Illinois Commerce Commission and all other activities incident to carrying on these cases. During the year of 1922, 50 of these cases were handled before the Illinois Commerce Commission.

The bureau also has supervision over the purchase of all right of way for State bond issue and Federal aid roads. Such work includes the preparation of right of way plats, descriptions and conveyance forms, the securing of information for condemnation suits, and investigations of legal problems which present themselves from time to time.

RECONNAISSANCE SURVEYS.

Before the location of a State bond issue or Federal aid road is decided it is necessary to make a reconnaissance survey, under the direction of competent engineers. All possible routes are investigated and a report is made showing a comparison of the various routes under consideration, with respect to length, cost, population served, safety and convenience to traffic. A public hearing is then held at which local interests are invited to advance their preferences. Using as a basis the information derived from the engineering reports and the public hearing the final location of the road is made. Reconnaissance surveys and reports have been completed on the entire State bond issue system and final locations have been decided on all but a few of the routes included in the original State wide system. The unlocated routes, at this time, are probably less than 10 per cent of the original system.

CHANGES IN ROAD DESIGN.

As a result of the experimental work carried on at the Bates experimental road another change in the design of concrete pavement was made during 1922, which has resulted in a large saving in construction cost. By increasing the edge thickness of the concrete slab to 9 inches and retaining the reinforcing steel near the edge of the pavement and the longtitudinal deformed metal center joint and the transverse steel across the center joint it has been possible to further reduce the thickness of the pavement to 6 inches and still obtain a stronger pavement than that obtained under previous designs. The results obtained from experiments carried on at the Bates experimental road have proven this new design entirely adequate to carry traffic permitted under the legal load limit in the State of Illinois.

A pavement 18 feet in width is considered as the minimum width for a double traffic road on the State bond issue system and near larger centers of population this width is increased to 20 feet. The shoulder to shoulder width of all roads on the system is 30 feet and all small culverts and bridges have a roadway width equal to the shoulder to shoulder width of the road. Long span bridges have a minimum width of 22 feet. All railroad overhead bridges have a width of 24 feet.

Important changes have been made in the policies concerning alignment and grades. Certain standard policies have been adopted with a view of furnishing traffic the maximum of safety and convenience.

Longer and easier horizontal and vertical curves have been used and provisions made for widening pavement on all horizontal curves having radias of less than one thousand feet.

TOPOGRAPHICAL WORK.

The topographic work in the State of Illinois which was carried on during 1921 and 1922 by and in cooperation with the United States Geological Survey and the State Geological Survey has been practically completed. These surveys cover the areas throughout the State where the most difficult location problems have been encountered. The work of the geological survey has been of great assistance to the Division of Highways in locating the State bond issue routes and has saved the State of Illinois a great deal of money which would otherwise have been expended for expensive topographic work. The State Geological Survey at the same time has been able to accomplish its own work to advantage.

WORK AWARDED IN 1922.

PAVEMENT—RIGID TYPES.

Class.	Width.	Miles.	Contract cost.	Cement cost.	Total cost.	Average per mile.
Federal Aid	18′	189.291	$3,841,766 06	$1,122,358 62	$4,964,124 68	$26,224 83
Federal Aid	Variable	58.710	1,171,548 56	374,626 49	1,546,175 05	26,335 80
State Bond Issue	18′	316.561	6,382,941 70	1,887,987 29	8,270,928 99	26,127 44
State Bond Issue	Variable	59.367	1,268,082 10	264,114 33	1,532,196 43	25,808 89
State Aid	18′	0.939	19,151 33	6,071 04	25,222 37	26,860 88
State Aid	Variable	0.355	8,761 31	1,848 30	10,609 61	29,886 22
County 15D	10′	45.119	654,909 15	165,444 78	820,353 93	18,182 01
County 15D	18′	107.319	240,047 25	659,701 29	2,899,748 54	27,019 90
County 15D	Variable	29.394	524,471 87	143,901 25	668,373 12	22,738 42
Total	----------	807.055	$16,111,679 33	$4,626,053 39	$20,737,732 72	$25,695 56

PAVEMENT—SEMI-RIGID TYPES.

Class.	Width.	Miles.	Contract cost.	Cement cost.	Total cost.	Average per mile.
Federal Aid and State Bond Issue	Variable	13.320	$396,732 44	$,734 36	$399,466 80	$29,990 00
State Aid	Variable	1.681	13,432 72	--------------	13,432 72	7,990 91
County 15d	10′	12.309	132,765 36	--------------	132,765 36	10,786 04
County 15d	16′	1.735	16,493 75	--------------	16,493 75	9,506 48
County 15d	18′	6.538	74,000 00	1,118 72	75,118 72	11,489 56
County 15d	Variable	33.445	411,754 33	--------------	411,754 33	12,311 39
Total	----------	69.028	$1,045,178 60	$3,853 08	$1,049,031 68	$15,197 19

HEAVY GRADING.

Class.	Miles.	Contract. cost.	Cement cost.	Total cost.	Average per mile.
Federal Aid	18.737	$168,591 85	$ 5,371 92	$173,963 77	$ 9,284 50
State Bond Issue	120.009	603,121 95	25,974 15	629,096 10	5,242 07
State Aid	0.272	3,334 65	--------------	3,334 65	12,259 74
County 15d	9.313	63,415 76	1,984 20	65,399 96	7,022 44
Total	148.331	$838,464 21	$33,330 27	$871,794 48	$5,877 36

SEPARATE BRIDGES.

Class.	Number.	Contract cost.	Cement cost.	Total cost.
Federal Aid	20	$315,409 49	$28,523 62	$343,933 11
State Bond Issue	63	510,482 80	47,468 78	557,951 58
State Aid	5	2,705 00	----------	2,705 00
County 15d	86	345,590 45	14,153 51	359,743 96
Total	174	$1,174,187 74	$90,145 91	$1,264,333 65

SUMMARY OF ALL WORK AWARDED DURING 1922 DIRECTLY BY THE STATE.

Class.	Miles or number.	Contract cost.	Cement cost.	Total cost.
Pavement (Rigid)	625.223	$12,692,251 06	$3,657,006 07	$16,349,257 13
Pavement (Semi-rigid)	15.001	410,165 16	2,734 36	412,899 52
Heavy Grading	139.018	775,048 45	31,346 07	806,394 52
Separate Bridges	88	828,597 29	75,992 40	904,589 69
Total	----------	$14,706,061 96	$3,767,078 90	$18,473,140 86

BY COUNTIES UNDER SECTION 15D.

Class.	Miles or number.	Contract cost.	Cement cost.	Total cost.
Pavement (Rigid)	181.382	$3,419,428 27	$969,047 32	$4,388,475 59
Pavement (Semi-rigid)	54.027	635,013 44	1,118 72	636,132 16
Heavy Grading	9.313	63,415 76	1,984 20	65,399 96
Separate Bridges	86	345,590 45	14,153 51	359,743 96
Total	----------	$4,463,447 92	$986,303 75	$5,449,751 67

GRAND TOTAL OF ALL WORK AWARDED DURING 1922—STATE AND COUNTIES—ALL TYPES AND WIDTHS.

Class.	Miles or number.	Contract cost.	Cement cost.	Total cost.
Pavement (rigid)	807.055	$16,111,679 33	$4,626,053 39	$20,737,732 72
Pavement (semi-rigid)	69.028	1,045,178 60	3,853 08	1,049,031 68
Heavy Grading	148.331	838,464 21	33,330 27	871,794 48
Separate Bridges	174	1,174,187 74	90,145 91	1,264,333 65
Grand total	----------	$19,169,509 88	$4,753,382 65	$23,922,892 53

NOTE: Mileage shown in this report does not include additions or deductions.

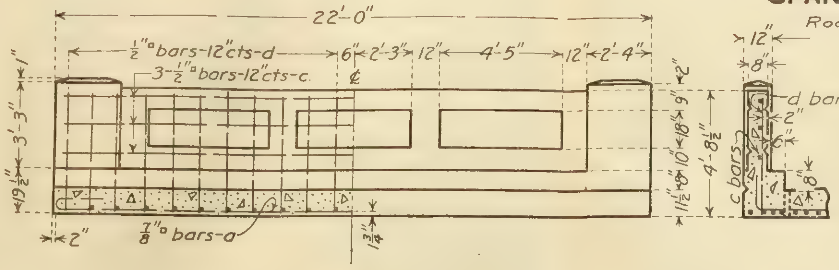
Rigid types include Portland Cement Concrete and Bituminous Concrete or Brick on Portland Cement Concrete base.

Semi-rigid types include Gravel, Macadam, and Bituminous Concrete or Brick on Gravel or Macadam base.

Sheet No. 1
2 Sheets.

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS

REINFORCED CONCRETE SLAB
SPAN - TWENTY FEET



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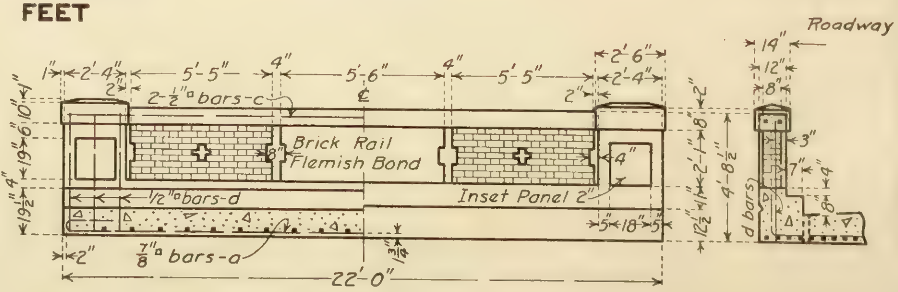

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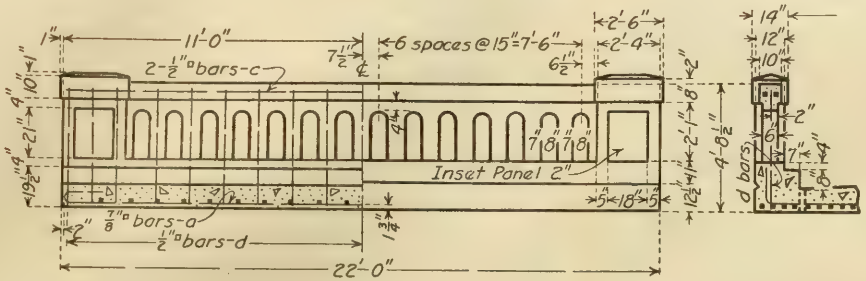

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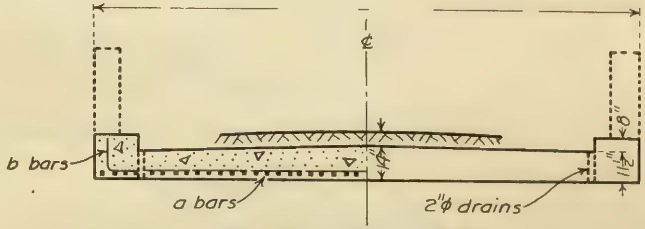
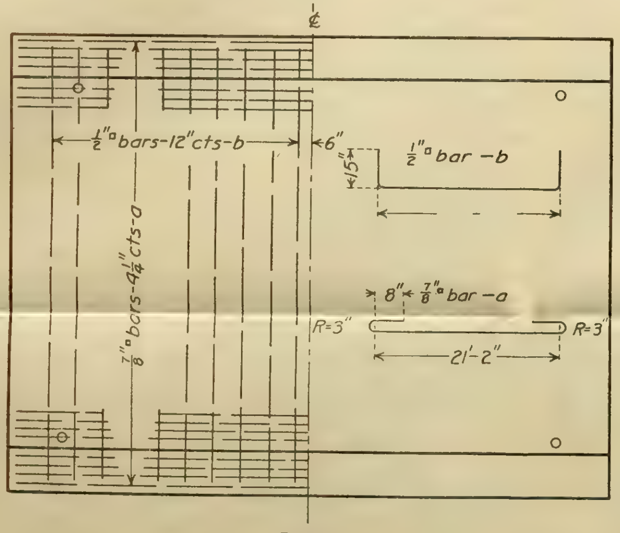


CROSS SECTION OF SLAB.



PLAN

BILL OF MATERIAL.

	16 FT. ROADWAY.				18 FT. ROADWAY.				20 FT. ROADWAY.				24 FT. ROADWAY				30 FT. ROADWAY.			
	Bars	No.	Size	Length	Bars	No	Size	Length	Bars	No.	Size	Length	Bars	No.	Size	Length	Bars	No	Size	Length.
RAIL A	a	50	7/8"□	24'-0"	a	56	7/8"□	24'-0"	a	62	7/8"□	24'-0"	a	73	7/8"□	24'-0"	a	90	7/8"□	24'-0"
	b	20	1/2"□	19'-6"	b	20	1/2"□	21'-6"	b	20	1/2"□	23'-6"	b	40	1/2"□	15'-0"	b	40	1/2"□	18'-0"
	c	6	1/2"□	21'-6"	c	6	1/2"□	21'-6"	c	6	1/2"□	21'-6"	c	6	1/2"□	21'-6"	c	6	1/2"□	21'-6"
	d	44	1/2"□	4'-3"	d	44	1/2"□	4'-3"	d	44	1/2"□	4'-3"	d	44	1/2"□	4'-3"	d	44	1/2"□	4'-3"
	Steel-Lbs. 3730				Steel-Lbs 4130				Steel-Lbs 4540				Steel-Lbs 5340				Steel-Lbs 6500			
	Concrete-Cu.Yds. 20.7				Concrete-Cu.Yds 22.5				Concrete-Cu.Yds. 24.2				Concrete-Cu.Yds. 27.7				Concrete-Cu.Yds 32.9			
RAIL B	a	50	7/8"□	24'-0"	a	56	7/8"□	24'-0"	a	62	7/8"□	24'-0"	a	73	7/8"□	24'-0"	a	90	7/8"□	24'-0"
	b	20	1/2"□	19'-6"	b	20	1/2"□	21'-6"	b	20	1/2"□	23'-6"	b	40	1/2"□	15'-0"	b	40	1/2"□	18'-0"
	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"
	d	12	1/2"□	4'-3"	d	12	1/2"□	4'-3"	d	12	1/2"□	4'-3"	d	12	1/2"□	4'-3"	d	12	1/2"□	4'-3"
	Steel-Lbs 3570				Steel-Lbs 3980				Steel-Lbs. 4390				Steel-Lbs. 5190				Steel-Lbs. 6350			
	Concrete-Cu.Yds. 19.6				Concrete-Cu.Yds. 21.3				Concrete-Cu.Yds 23.0				Concrete-Cu.Yds. 26.5				Concrete-Cu.Yds. 31.7			
	Brick Rail-Cu.Yds. 1.6				Brick Rail-Cu.Yds 1.6				Brick Rail-Cu.Yds. 1.6				Brick Rail-Cu.Yds. 1.6				Brick Rail-Cu.Yds. 1.6			
RAIL C	a	50	7/8"□	24'-0"	a	56	7/8"□	24'-0"	a	62	7/8"□	24'-0"	a	73	7/8"□	24'-0"	a	90	7/8"□	24'-0"
	b	20	1/2"□	19'-6"	b	20	1/2"□	21'-6"	b	20	1/2"□	23'-6"	b	40	1/2"□	15'-0"	b	40	1/2"□	18'-0"
	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"	c	4	1/2"□	21'-6"
	d	38	1/2"□	4'-3"	d	38	1/2"□	4'-3"	d	38	1/2"□	4'-3"	d	38	1/2"□	4'-3"	d	38	1/2"□	4'-3"
	Steel-Lbs. 3670				Steel-Lbs. 4070				Steel-Lbs. 4980				Steel-Lbs. 5280				Steel-Lbs 6440			
	Concrete-Cu.Yds. 20.1				Concrete-Cu.Yds. 21.9				Concrete-Cu.Yds. 23.6				Concrete-Cu.Yds. 27.1				Concrete-Cu.Yds 32.3			

Class A concrete to be
used throughout.
Proportions-1:2½:4.

USE RAIL_____; _____FT ROADWAY.

STANDARD	COMPUTED	- Walter S. Todd
	CHECKED	- Don C. Estes
	DRAWN	- W.B. Walraven
	CHECKED	- H. V. Gulick
SPECIAL	ASSEMBLED	-
	CHECKED	-

EXAMINED________________19___

________________ BRIDGE ENGINEER

PASSED

________________ ENGINEER OF DESIGN

APPROVED

________________ CHIEF HIGHWAY ENGINEER

A new design for a reinforced concrete slab superstructure with plain or ornamental concrete rails or brick rails, as desired.

BRIDGE DIVISION.

The principal duties of the Bridge Division of the Bureau of Design are to:—

1. Prepare plans, specifications and estimates for all State bridge work.
2. Prepare plans, specifications and estimates for County and Township bridge work, upon request by County Superintendent of Highways.
3. Check and approve bridge and culvert plans prepared by County Superintendent of Highways.
4. Investigate and report upon the stability of existing highway bridges, and make recommendations for repairs or replacement.
5. Check and approve the detailed shop drawings for steel bridges, prior to fabrication.
6. Make shop inspection of structural steel for bridges to insure good workmanship and correct errors of fabrication.
7. Make preliminary surveys and investigation of sites for new bridges.
8. give advice and assistance to County Superintendents of Highways and other highway officials, on all matters pertaining to bridges or culverts upon the public highways.
9. Prepare and distribute to all highway officials, specifications governing the design and construction of all structures carrying highway traffic, as required under the Road and Bridge Law.

During the year 1922 new standard designs were prepared for reinforced concrete slab super-structures for spans of 10 to 30 feet; abutments for slab bridges for heights of 9 to 20 feet; reinforced concrete girder super-structures for spans of 30 to 60 feet; and steel super-structures for spans of 50 to 200 feet. These designs represent the latest practice in highway bridge construction.

Toward the close of the year a new edition of the General Specifications for Bridge Work was prepared. In these specifications a number of vital changes were made from the previous edition. Probably the most important change was that requiring contractors to submit unit prices on each item of construction and the elimination of lump sum bids covering several classes of work. Other changes were made in various details of design and construction which are expected to result in better workmanship and more permanent construction.

The following table summarizes briefly the amount of work handled by the Bridge Division from 1906 to 1922, inclusive.

SUMMARY OF BRIDGE WORK TO DECEMBER 31, 1922.

Year.	Plans and specifications prepared.	Estimated cost.	Contracts let on State plans.	Contract price.	Foreign plans approved.
1906	15	--------------	11	$ 37,035 00	Plans prepared by County Sup't. of Highways and other.
1907	113	--------------	48	41,519 00	
1908	149	--------------	64	165,674 00	
1909	122	--------------	92	133,285 00	
1910	203	--------------	141	148,432 00	
1911	241	--------------	127	238,903 00	
1912	214	--------------	150	212,694 00	--------------
1913	238	$ 342,052 00	139	200,834 00	5
1914	269	470,363 00	109	184,792 00	269
1915	707	984,420 00	565	541,509 00	230
1916	735	1,169,743 00	439	566,657 00	653
1917	480	812,614 00	502	582,993 00	503
1918	206	499,702 00	169	277,130 00	443
1919	231	761,458 68	202	514,897 00	725
1920	443	2,841,896 22	301	2,208,494 84	261
1921	384	2,134,476 49	337	1,909,455 67	362
1922	374	2,365,726 45	317	1,775,066 00	839
Total	5,124	$12,382,451 84	3,713	$9,739,370 51	4,290

The above table does not include bridges and culverts built in connection with State aid, Federal aid and State bond issue road work, as such structures are included in the reports on road construction. During the year 1922, plans were prepared for 5,410 bridges and culverts, to be constructed in connection with State road contracts—estimated cost $2,627,299.37. Adding this to the distinctive bridge work given in the table above, the total output of the Bridge Division, during the year 1922, was 5,784 plans for bridges and culverts—estimated to cost $4,993,025.82. This shows an increase of 17 per cent over the output of 1921. Without making any deduction for other activities, the average cost of preparing plans and specifications in 1922 was 1.59 per cent of the estimated cost of the bridge work for which plans were prepared.

In the following table the work done during 1922 is classified according to funds used. The number of plans prepared for county work was slightly less than the preceding year, but the estimated value of the work was almost double, showing that the counties were building more large bridges than during 1921.

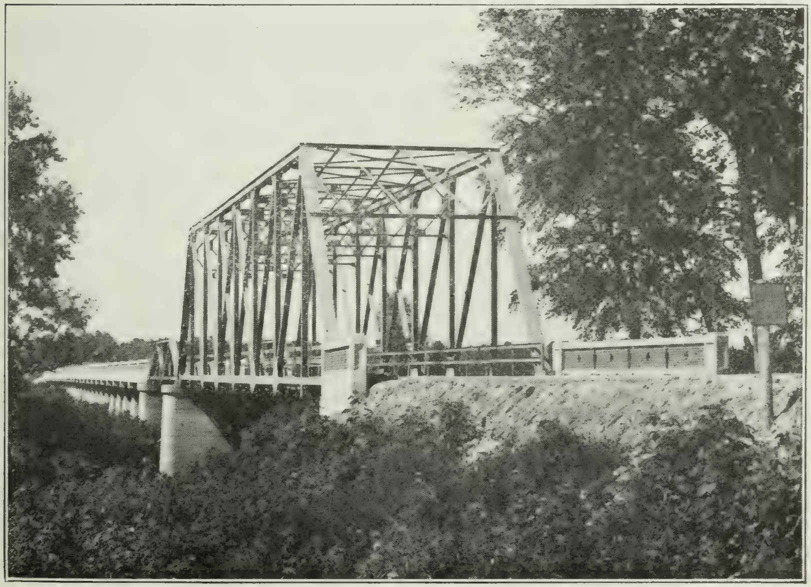
FROM JANUARY 1, 1922 TO DECEMBER 31, 1922.

Classification.	Plans prepared.		Contracts awarded.		
	Number.	Estimated cost.	Number.	Estimated cost.	Contract price.
County Bridges	254	$1,166,465 00	196	$ 744,268 00	$ 665,350 26
State Bridges	120	1,199,261 45	121	1,193,400 01	1,109,715 74
In State road contracts	5,410	2,627,299 37	(with	pavement and	grading)
Total	5,784	$4,993,025 82	317	$1,937,668 01	$1,775,066 00

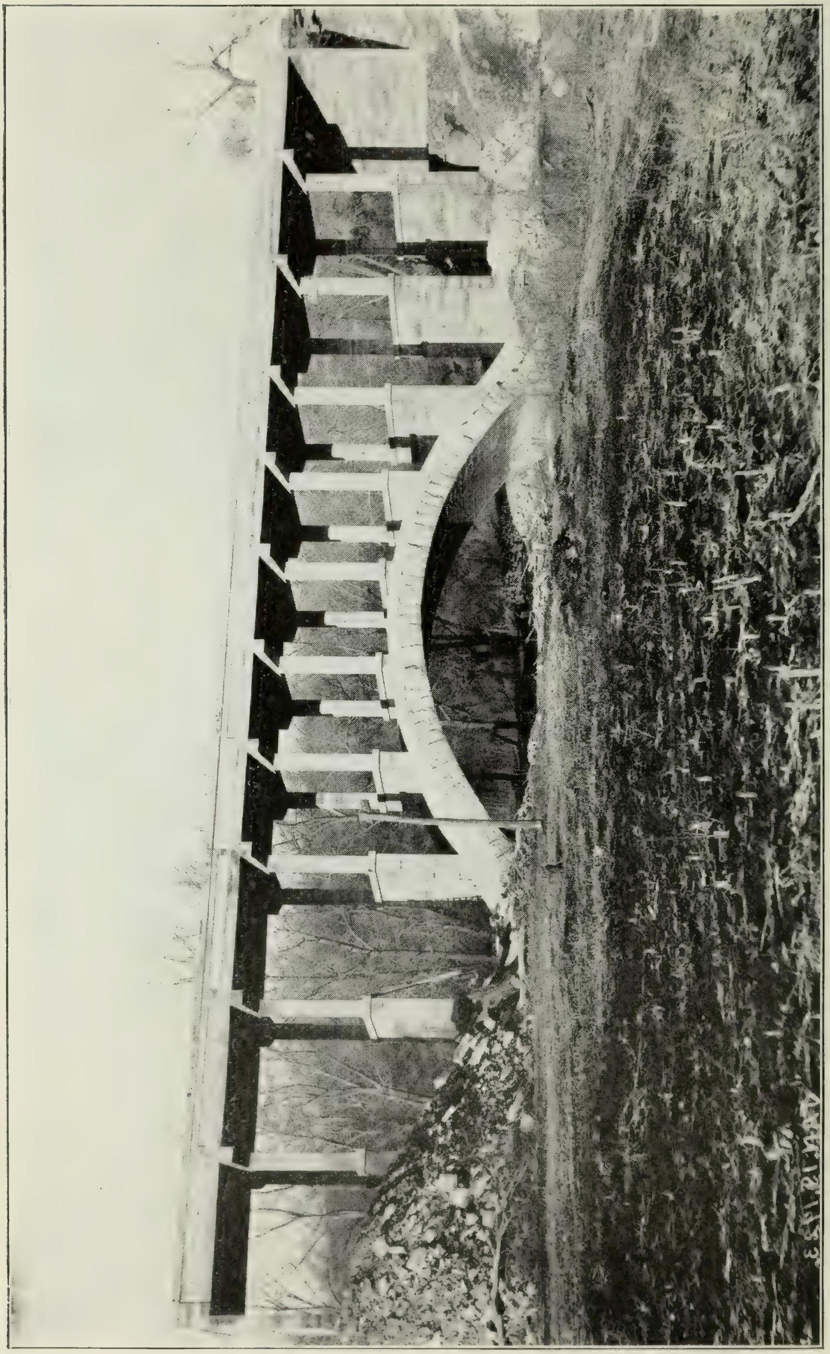
Other work performed during the year 1922:

Plans checked and approved for county superintendents of highways	839
Existing bridges analyzed for strength	12
Shop drawings for steel bridges checked	45
Shop inspection of steel bridges made	33

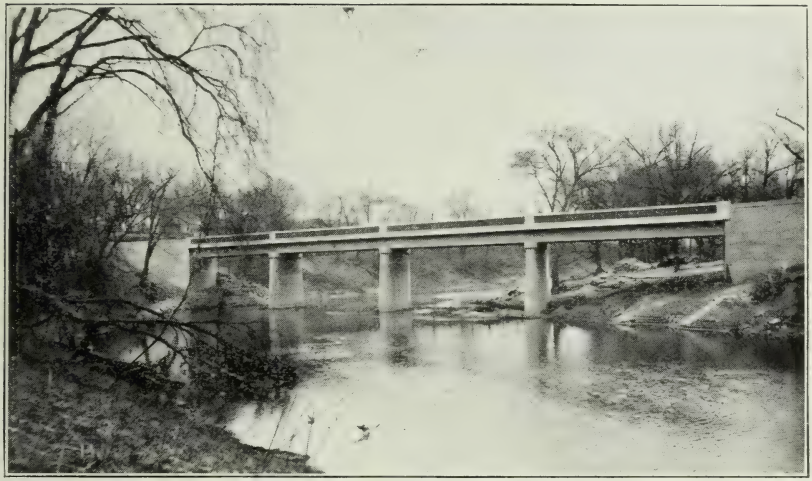
A permanent bridge for modern highway traffic. Over Middle Fork of Saline River, east of Harrisburg. One span of 140 feet. Four spans of 30 feet each. Contract price $26,985.13.



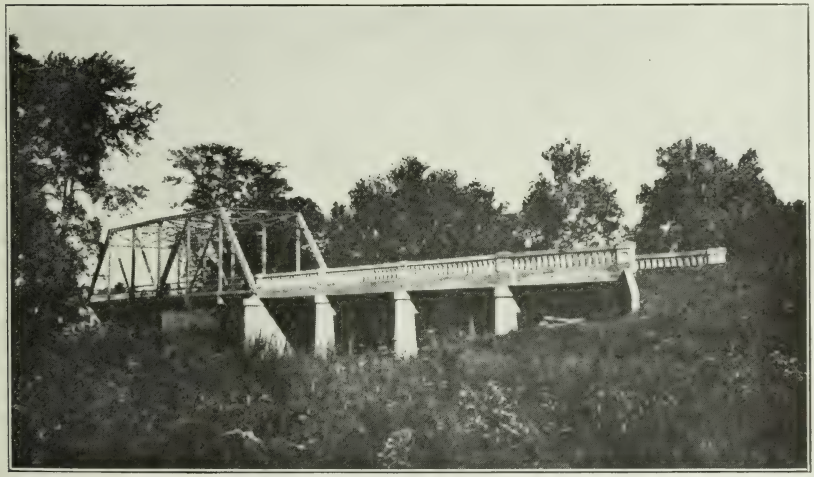
Bridge over Little Wabash River near Louisville. One steel span of 150 feet and one of 60 feet. Thirty reinforced concrete spans of 28 feet each. Contract price $169,644.66.



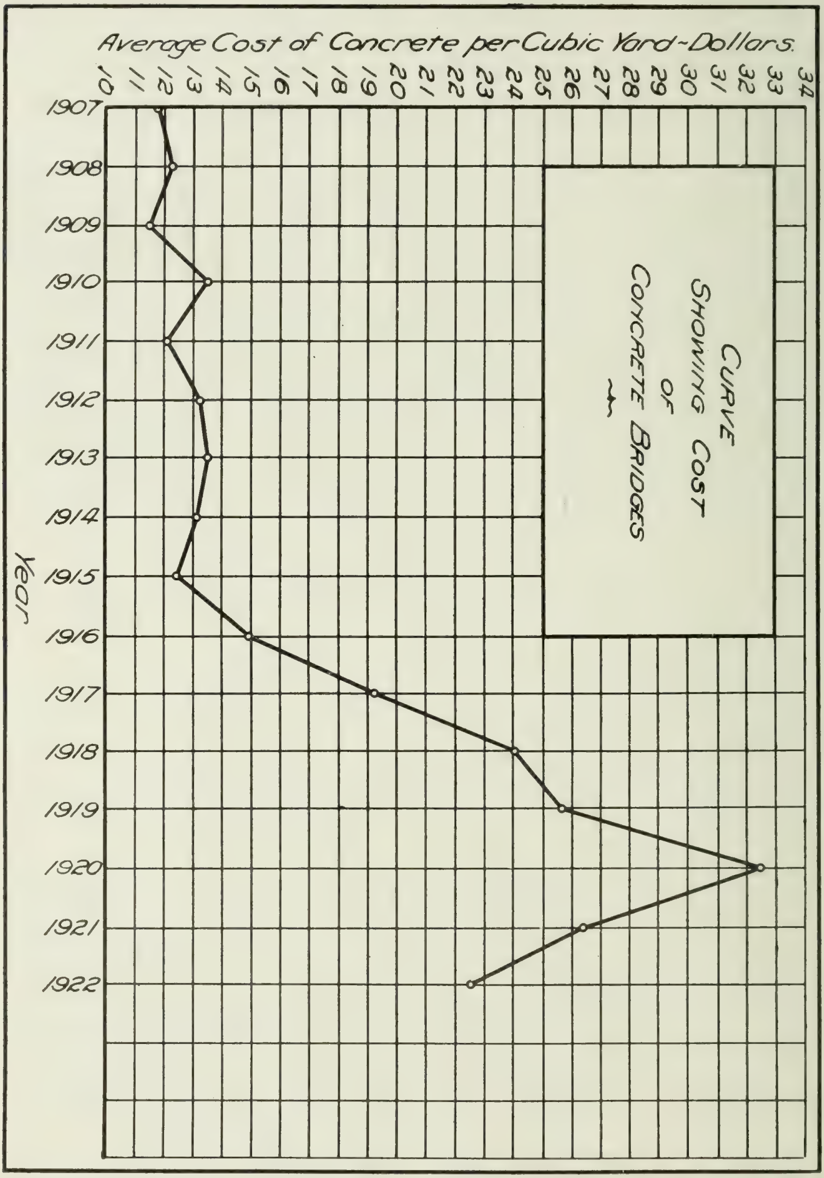
Fifth Street Bridge, LaSalle, on Bond Issue Route No. 7. Original stone arch 75 foot span, built 1871. Reinforced concrete superstructure built 1922. 6 spans at 20 feet; 5 spans at 15 feet.



Bradley Bridge, Livingston County. Deck girders with brick walls. Four spans at 60 feet each. Contract price $27,772.40.



Bridge over Macoupin Creek near Carlinville. One steel span of 100 feet. Eight concrete spans at 24 feet each. Contract price $40,914.34.



The following curve shows the average cost of concrete bridge work from 1907 to 1922. The cost is given per cubic yard of concrete, which includes reinforcing steel, cement and all other items of construction cost. The peak price was reached in 1920, with a somewhat lower price in 1921, and still lower in 1922.

BUREAU OF CONSTRUCTION.

Under the supervision of the Division of Highways there was completed 740.8 miles of pavement during 1922, a record exceeding that of any previous year in Illinois and the world's record for pavement construction in a given year by any state highway department.

Uninterrupted construction progress was maintained until about August 1, reaching a high point of 41 miles per week during the week of July 27, but the effect of the coal strike on the cement industry and transportation, and the effect of the railroad shopmen's strike on all shipping was responsible for a falling off in the weekly production during August and September, during which months we should have maintained very closely the high point attained in July. That this weekly production was not more seriously curtailed was due largely to the foresight of many contractors in storing large amounts of cement and aggregates early in the season, for in practically every instance where such storage was maintained, contractors were able to work almost uninterruptedly until the end of the season. An exceptionally dry summer and fall and a temperature above normal during October and November also assisted in making up for the losses encountered due to the coal and the shopmen's strikes. Benefiting by the 1922 experience every indication now points to the fact that contractors for 1923 will store as extensively from February to May as facilities will permit.

To a degree never before reached, 1922 brought forth a greater production per outfit by the contractors, a quality of work never before attained in this State and reasonable unit prices commensurate with the work done. A number of factors may be mentioned which were directly responsible for these conditions and for the large mileage completed during the year, especially since these same factors may be anticipated to continue to characterize future road construction in Illinois: The utilization of machinery and equipment selected by the contractor after a careful analysis of his requirements, based upon his previous years' records and the job in question; not only the development of new equipment but also the stabilization and improvement of present equipment on the part of the manufacturers; contractors who have been doing work in this and other states for a number of years and who have developed highly trained organizations of capable men; a careful study of plant layout, cost production, etc., on the part of contractors; and a more careful and rigid inspection on the part of the engineers of this division. In addition, the apparent limited facilities of the railroads have been strengthened by the policy of storing aggregates during the winter and spring months to the extent that instead of a six to seven months period of heavy shipments the same shipments have been extended over a period of approximately ten months. Also a program, as may be noted by inspection of the map showing work completed, widely scattered throughout the State, brings into play not a limited number of railroads and smaller number of aggregate producing points as formerly but practically the entire railroad system of the State and all producing points of aggregates of this State and on the borders of the states adjacent. Furthermore, the policy of having heavy grading and bridge work done at least a year in advance of the paving has, on one hand secured more capable contractors familiar with their own type of work, and consequent lower unit costs; and on the other hand has turned over to the paving contractor the strictly paving work on which he can base an intelligent bid and on which he can start paving as soon as the weather opens up in the spring without waiting for culverts and bridges to be built and grades to settle. The policy of awarding paving contracts in the early fall for the following season's construction also serves the same purpose as the other features above noted.

CONSTRUCTION BY DAY LABOR.

During 1922 two more construction units were added to the day labor organization, making a total of four outfits in operation during the season. One of these outfits was located on Route 2 between Cobden and Carbondale; a second on Route 4 building six and one-half miles north from Dwight and on Route 17 building five and six-tenths miles from Dwight westerly; and two outfits were located on Route 36 from Winchester to Pittsfield.

The Dwight outfit was considered as working under normal conditions where the cost of the work could be compared favorably with costs of the ordinary contractor. The other outfits, however, were assigned to particular sections where there were uncertain and undesirable features which made construction hazardous and expensive.

On the Winchester-Pittsfield job material from commercial plants was too high in price and the haul from the railroad prohibitive; therefore, the coarse aggregate for this job will be practically all obtained from a local quarry and the fine aggregate will be dredged from the Illinois river and delivered to the plant by barge. Cement will be shipped in by barge.

The Dwight job was completed during 1922.

The Carbondale job will be continued and completed during the late summer of 1923.

The Winchester-Pittsfield job to date has been confined almost entirely to grading the heavy cuts and fills in the vicinity of the Illinois river, and only three and one-half miles of paving was laid in 1922. With practically all the grading completed, however, both paving outfits will start in paving early in the coming year and there is no doubt but that the section will be entirely paved during 1923.

Whenever possible to utilize it, surplus war equipment was used in making up each day labor outfit, and new equipment was purchased only when war equipment was not available or where its use was not an economical proposition. The amount of new equipment purchased is a small percentage of the total equipment used.

The total pavement laid by day labor during 1922 was 22.21 miles, the yardage of excavation and fill, 166,945 cubic yards, and bridge work, 2,808 cubic yards of reinforced concrete and two steel spans.

TRANSPORTATION.

Early in 1922 there was established in the Bureau of Construction a Traffic Department primarily to handle the "freight reductions" and "annulment of war tax" referred to in practically all the 1921 and 1922 contracts. On January 1, 1922, the war tax on aggregates was annulled and on July 1, 1922, a general 10 per cent freight reduction caused a refund to the Division of Highways on practically every contract in force. During 1922, on final settlements made, the Traffic Department checked up refunds to the State in the amount of $122,000.00 in freight reductions and $41,000.00 war tax.

In addition, the Traffic Department has worked out numerous interchange propositions in Springfield and other points and has developed the establishment of numerous new rates. By reclassifications, it has saved during 1922 approximately $5,000.00 in freight on shipments of surplus war material into Springfield.

During the coal strike and car shortage the representatives of the Traffic Department were able to use their offices with the several railroad companies in getting better service and increased transportation facilities, this being largely due to their ability as trained men to understand the rail situation. The work done in the scope of the Traffic Department has been very gratifying and it has been demonstrated that the men making up the personnel of this department were able not only to assist the State in the matter of traffic movement but were also able to assist contractors and county highway organizations in adjustment of freight rates, reclassifications of materials, establishment of competitive rates which will thereby open up competition and establish some lower rates on materials.

CRUSHED STONE SHIPMENTS FROM THE STATE PENITENTIARIES.

There was shipped, during 1922, 53,000.88 cubic yards of stone from the Joliet penitentiary, about 16,000 cubic yards of this being to State work, the balance to townships in the several counties adjacent to the penitentiary.

From Menard there was shipped 4,824 cubic yards of stone to the townships in the several counties adjacent to the penitentiary.

This total shipment of penitentiary stone amounting to 58,712 cubic yards indicates a saving to the township or county receiving same of about one dollar and fifteen cents per cubic yard, the usual price paid for commercial stone. The records on the books show that all times during the season the demand for penitentiary stone exceeded the supply, thereby indicating that the practice of utilizing penitentiary stone is meeting with general favor by the townships and counties adjacent to the two penitentiaries. It is safe to state that any development for increasing the output of stone from the two penitentiaries will be of of material benefit to the road program of the State, particularly to the poorer townships who are not able to go to the expense of building the higher types of roads.

GENERAL SUMMARY
BUREAU OF CONSTRUCTION
1922.

No. paving contractors	103
No. paving mixers	213
No. paving mixers operated with industrial railway	44
No. paving mixers operated with trucks	168
No. paving mixers operated with central proportioning plants	28
No. paving mixers operated from large storage piles	142
No. bridge contractors	67
No. grading contractors	59
Total number of paving, grading, and bridge contractors having work in 1922	209

Largest daily run, 1,583 feet—W. C. Meneely.
Largest weekly run, 6,739 feet—W. F. Smith.
Largest monthly run, 19,549 feet—Jansen & Schaefer.
List of ten contractors having largest average daily output (single shift):

1—672 ft. Jansen & Schaefer.
2—651 ft. J. J. Dunnegan.
3—599 ft. W. C. Meneely.
4—561 ft. H. K. Rhoades.
5—555 ft. Indiana Road Paving Co.
6—553 ft. J. W. Etchison.
7—545 ft. Cameron Joyce & Co.
8—543 ft. H. H. Hali.
9—538 ft. Eiff & Simons.
10—528 ft. Barnes & Verhey.

Ten thousand men and 2,500 teams were employed directly in the construction of road and bridge work this year.

SUMMARY OF MILEAGE CONSTRUCTED DURING 1922.

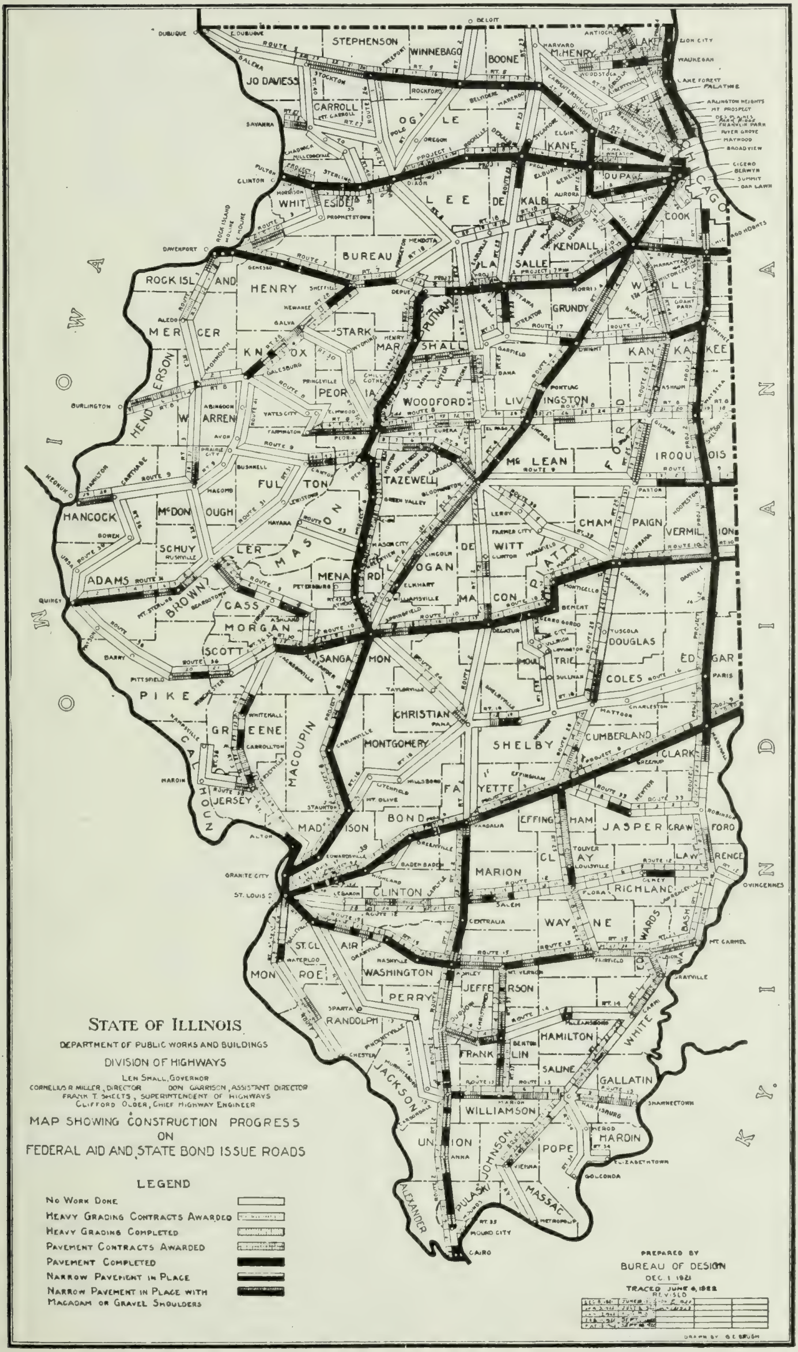
	Pavement—miles.	Grading—miles.	Bridges.
**Carried over from 1921	570.69	146.37	*80
Awarded in 1922	887.95	154.28	138
Additions in 1922	30.46		
Total for 1922	1,489.10		
Constructed in 1922	740.80	190.84	142
**Carried over to 1923	748.30	109.81	76

* In the 1921 report this figure was given as 41 but was for the number of bridge contracts and not individual bridges.

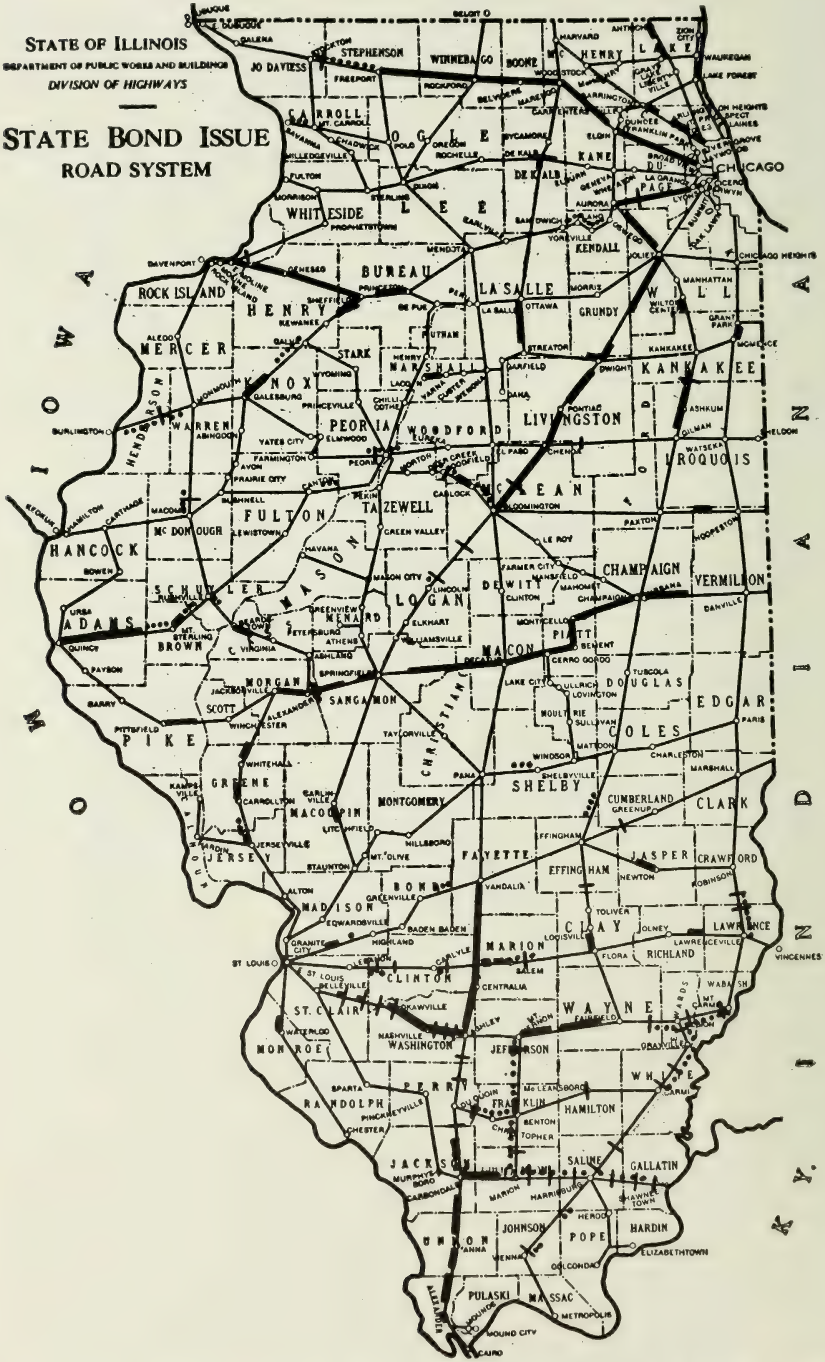
** Mileage carried over in each case includes considerable mileage awarded late in the year for construction the year following.

SUMMARY OF DIFFERENT TYPES OF IMPROVED ROADS CONSTRUCTED IN 1922 LENGTH GIVEN IN MILES.

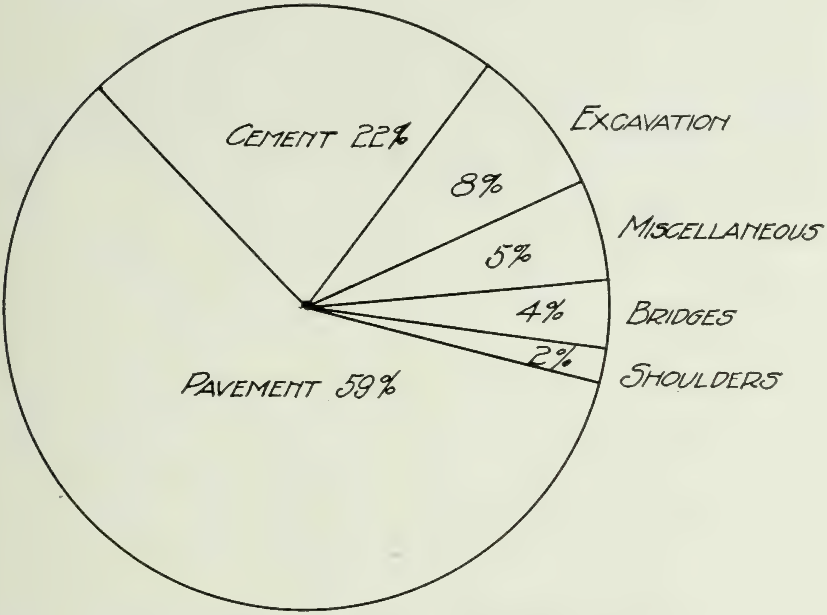
Type.	Federal Aid.	State Bond Issue.	State Aid.	County 15d.	Total.
9 ft. Conc				5.16	5.16
10 ft. Conc			2.10	52.69	54.78
16 ft. Conc	3.28	.69			3.79
18 ft. Conc	21.75	514.13		89.64	625.52
20 ft. Conc		1.28			1.28
24 ft. Conc				4.60	4.60
30 ft. Conc				.27	.27
9 ft. Mono Brick		3.80			3.80
18 ft. Mono Brick	1.62				1.62
10 ft. Bit. Macadam				3.01	3.01
18 ft. Bit. Macadam				2.88	2.88
15 ft. Novaculite				6.76	6.76
10 ft. Gravel				9.08	9.08
14 ft. Gravel				14.32	14.32
16 ft. Gravel	.40			3.34	3.74
Total	27.05	519.90	2.10	191.75	740.80
Grading in cu. yds	236,622	2,305,271	7,755	35,477	2,585,125
Bridges in cu. yds. of Concrete	2,774	24,555	463	6,093	33,885



Map showing construction progress January 1, 1923.



Map showing work constructed during the year 1922. Paving, grading, bridges.



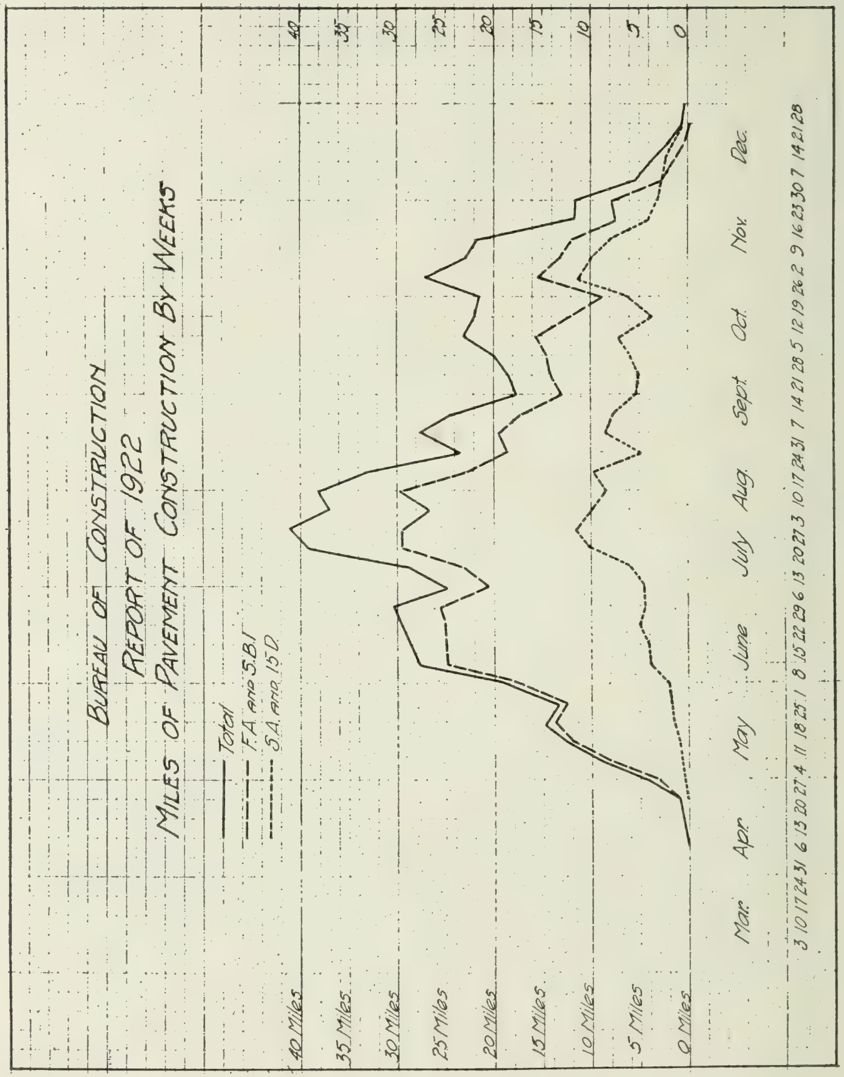
COST ANALYSIS OF 18 FOOT CONCRETE PAVEMENT.

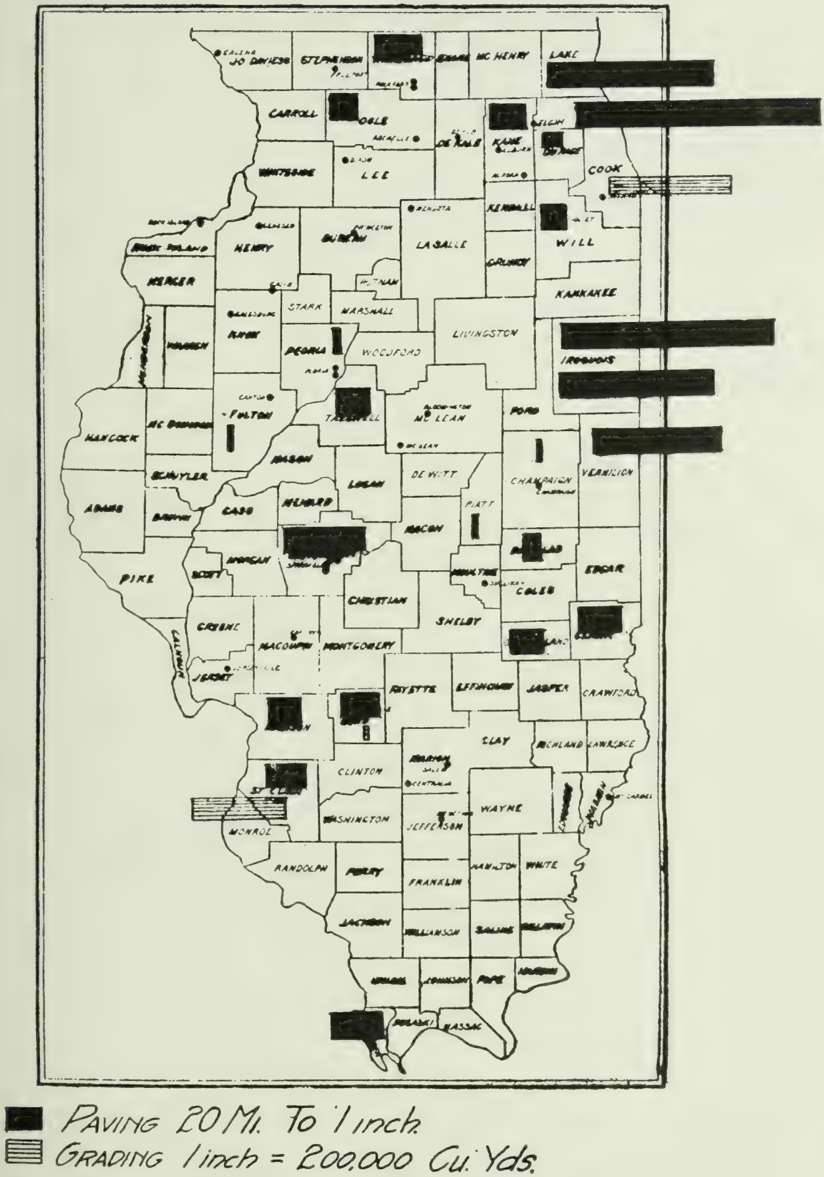
Average construction cost per mile for 126 miles of 18 ft. concrete pavement, including bridges and heavy grading was $28,746.37.

Miscellaneous includes guard fence, catch basins, section markers, gutters and all extra work not included under other headings.

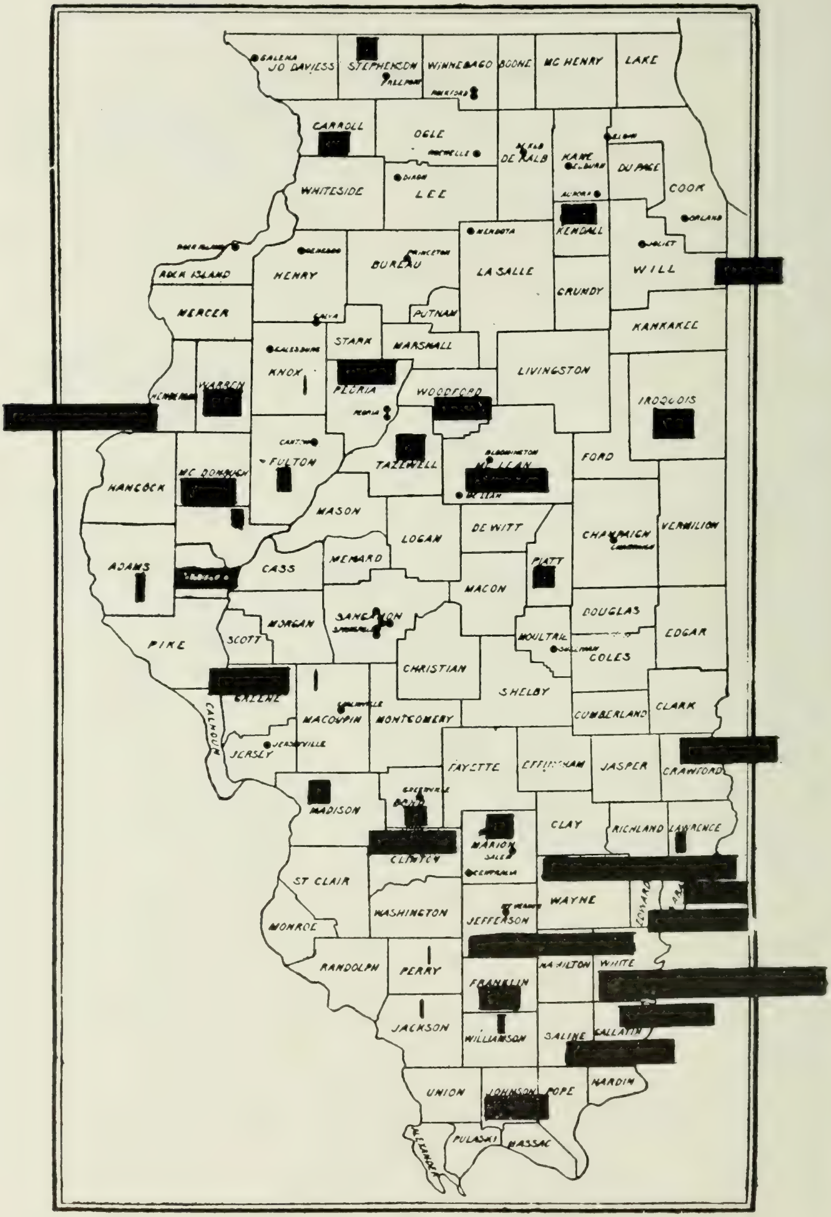
Note—This information compiled from 126 miles of 18 ft. concrete pavement. Sections taken from all parts of the State and includes all heavy grading and bridge contracts on these sections.

Clearing through the Illinois River bottoms for Bond Route 10 at Florence. This work is being done by State day labor forces.


BUREAU OF CONSTRUCTION
REPORT OF 1922
MILES OF PAVEMENT CONSTRUCTION BY WEEKS
Total
F.A. AND S.B.I.
S.A. AND 15D.
40 Miles
35 Miles
30 Miles
25 Miles
20 Miles
15 Miles
10 Miles
5 Miles
0 Miles
40
35
30
25
20
15
10
5
0
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
3 10 17 24 31 6 13 20 27 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28

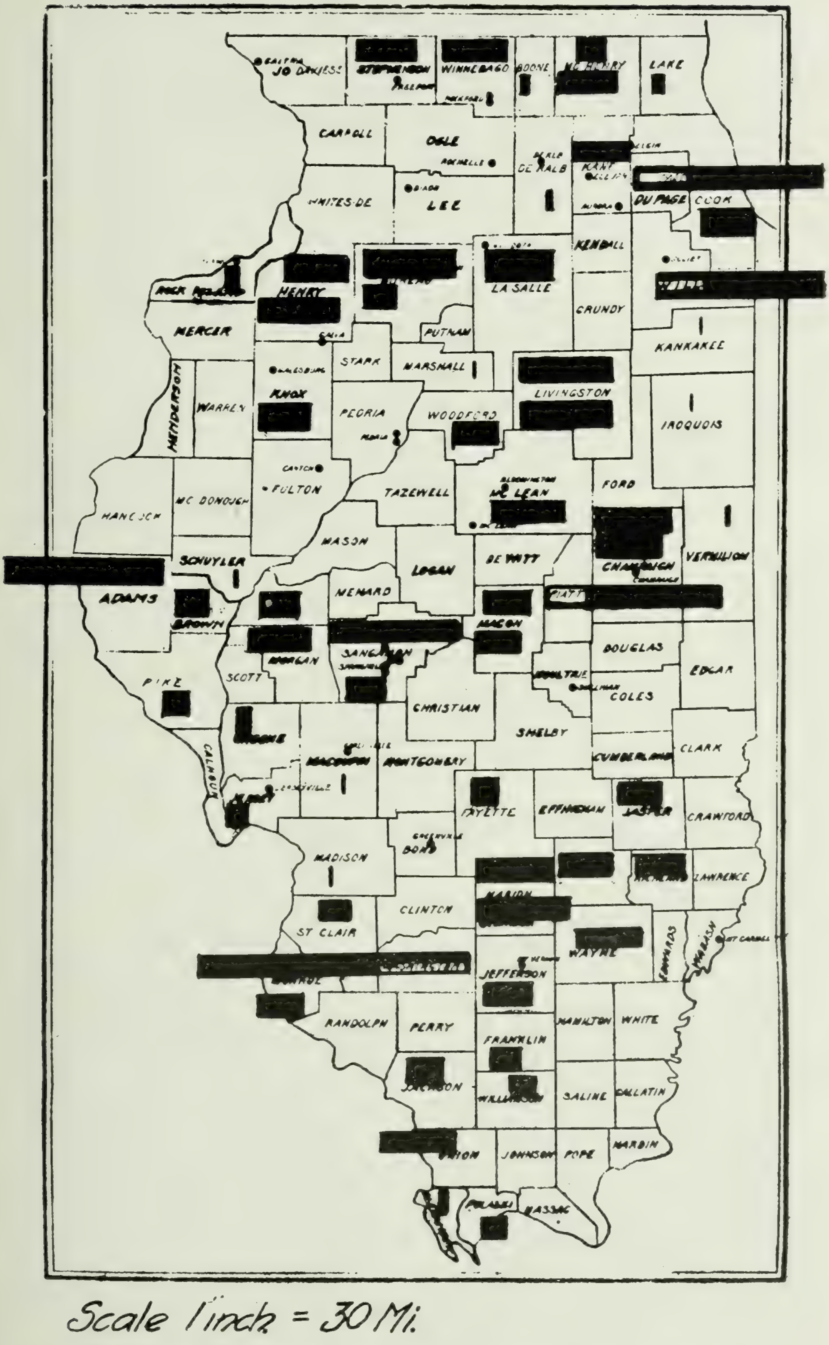


Distribution of grading construction by counties. Built by State bond issue and Federal aid funds.



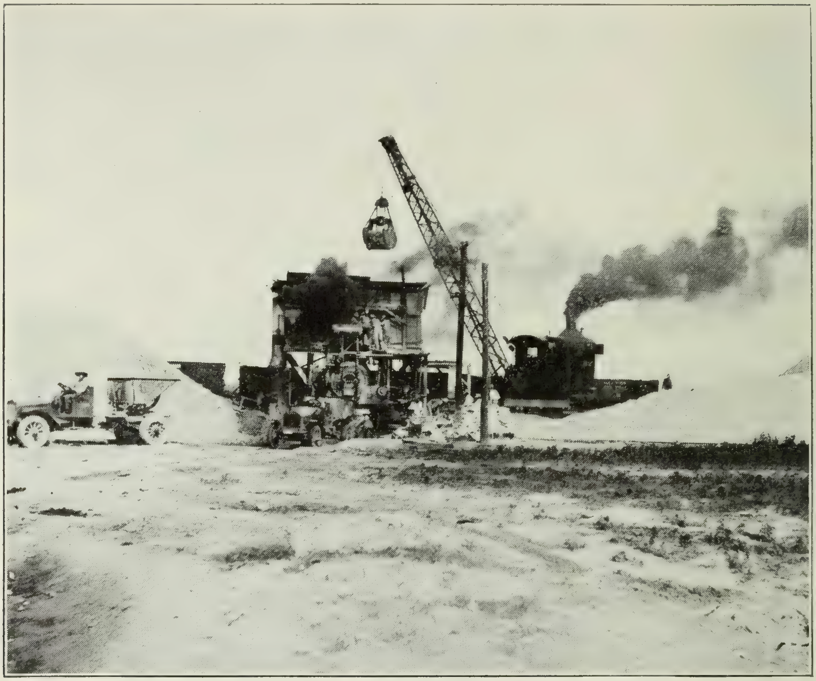
Scale 1inch = 200,000 Cu. Yds.

Distribution of pavement construction by counties. Built by State bond issue and Federal aid funds.

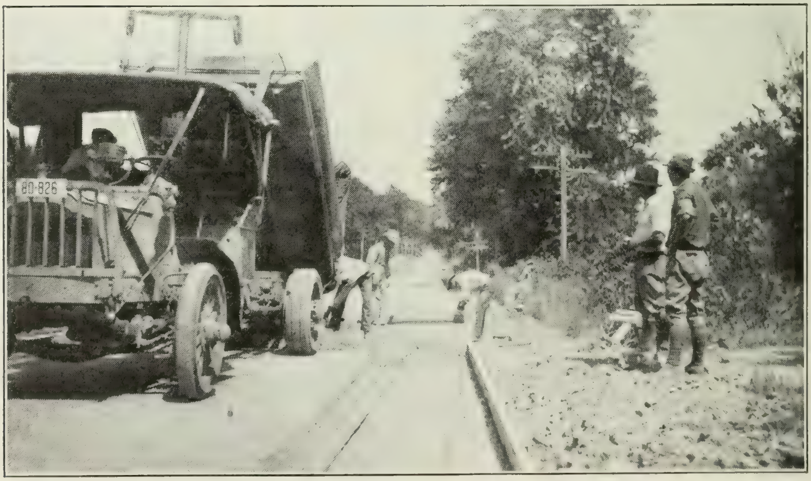


Scale 1 inch = 30 Mi.

Distribution of pavement and grade construction built by County road funds.

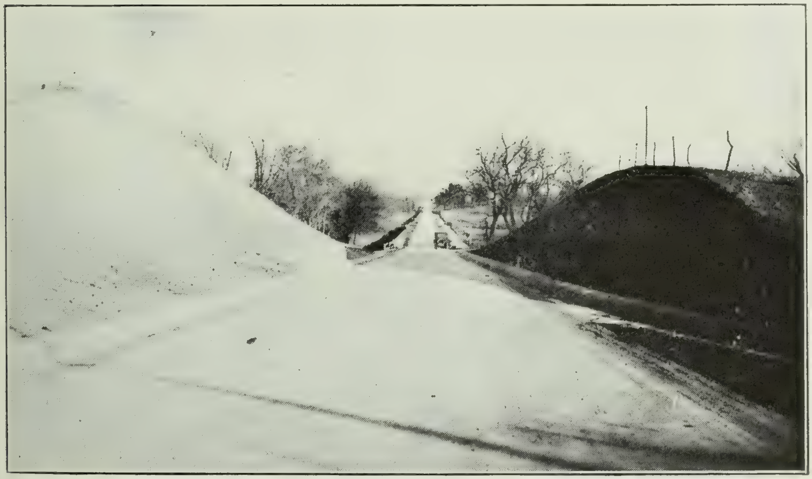


A typical setup for a Central Mixing Plant. Ernest Berns and Company on section 31, Bond Route 2.

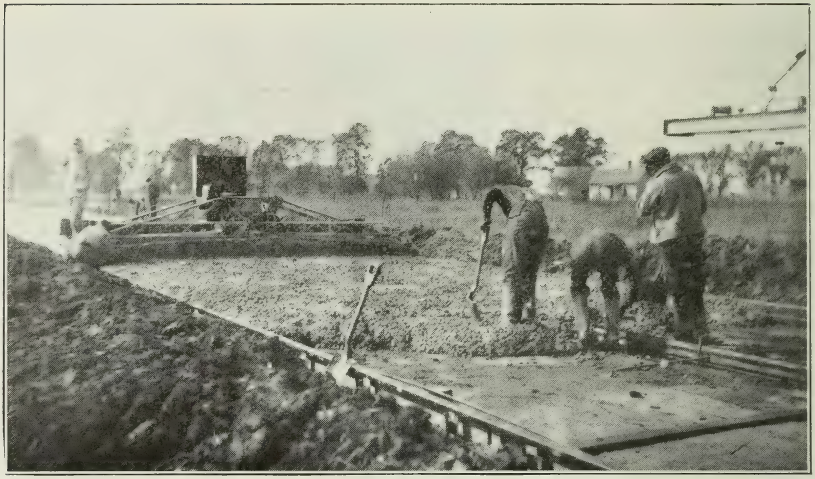


Method of widening an old 10 foot pavement to accommodate two lines of traffic. Work done by State day labor forces on Bond Route 10, east of Pittsfield.

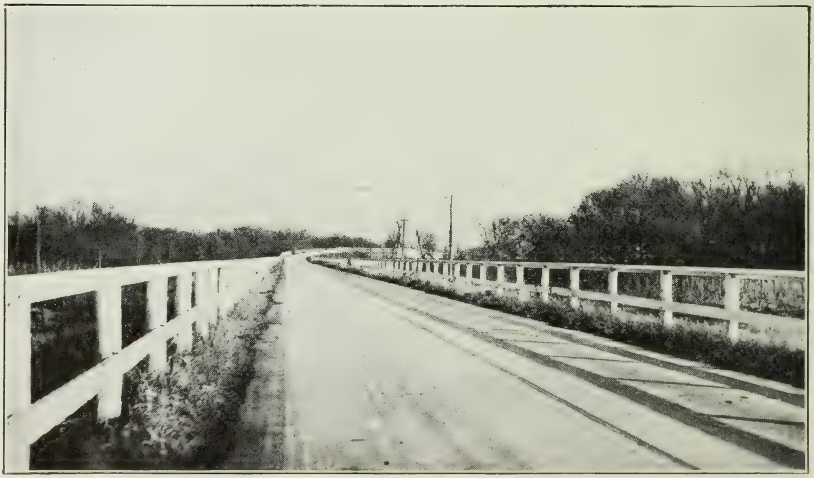
Intersection of Bond Route 28 with Bond Route 7. 18 foot pavement built by J. J. Dunnegan & Company.



Cut and gutter section on Bond Route 7, Section 3, built by Capital Construction Company.



Method of placing center joint in standard 18 foot pavement. Work done by Booth & Gilchrist, Section 4, Bond Route 4.



Standard guard rail construction. Built by J. J. Dunnegan. Section 1, Bond Route 7.

BUREAU OF MAINTENANCE.

The law provides that all hard-surfaced roads built under the State aid, Federal aid and bond issue laws shall be maintained by the Division of Highways. It also provides that the county shall pay one-half of the maintenance cost on such types as asphaltic concrete on macadam base, bituminous macadam, water bound macadam and gravel, and that the county shall bear the entire expense and have maintenance supervision over earth and oiled earth roads built under State aid.

The maintenance of all State highways, for which the State is responsible, is now carried on by means of the patrol system, supplemented by a few outfits working under the gang system. This work is divided into 122 patrols with an average of about twenty miles to the patrol. The patrolman is furnished with a truck and other necessary equipment and is responsible for the condition of his patrol to which he is required to give his entire time.

The following table shows the maintenance cost for the year 1922 figured on per mile basis:

Type.	*Miles.	Cost per mile basis.		
		Maintenance on pavement surface.	Upkeep on roadsides.	Total.
Brick	125.31	$ 62 36	$219 71	$ 282 07
P. C. Concrete	1,405.84	68 24	178 04	246 28
Bit. Macadam	34.34	129 36	141 21	270 58
W. B. Macadam	20.54	987 52	26 83	1,014 35
Gravel	66.69	152 02	96 29	248 30
Oiled Earth	100.34	387 72	34 62	42 34
Earth	354.84	92 25	81 42	173 67
Bit. Concrete	38.45	116 02	161 60	277 62
Total	2,146.35			

NOTE—The above figures include the cutting of weeds and vegetation, cleaning of ditches and drains and maintenance of pavements.

* It should be understood that the schedule of mileage given in this table is the total mileage of roads of the different types maintained during the calendar year regardless of widths.

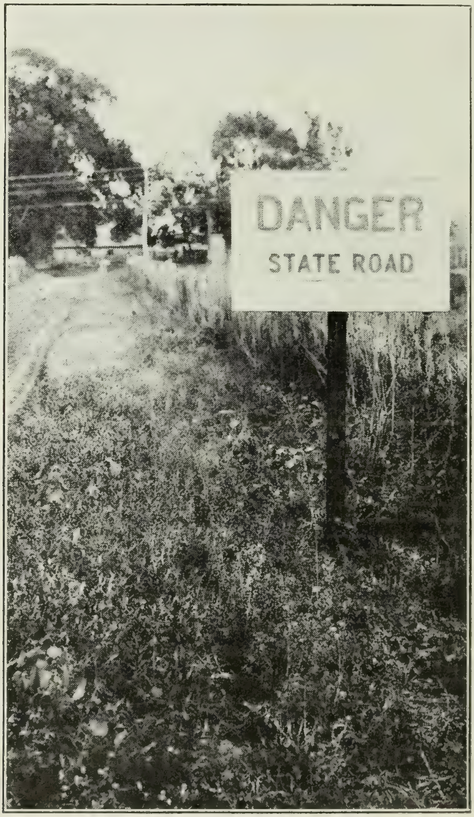
HIGHWAY MARKING SYSTEM OF THE STATE OF ILLINOIS.

The marking system adopted by the State of Illinois has been designed to serve a two fold purpose. First, to make the highways as safe as possible under present day traffic conditions. Second, to impart as complete directory information to the traveling public as may be feasible.

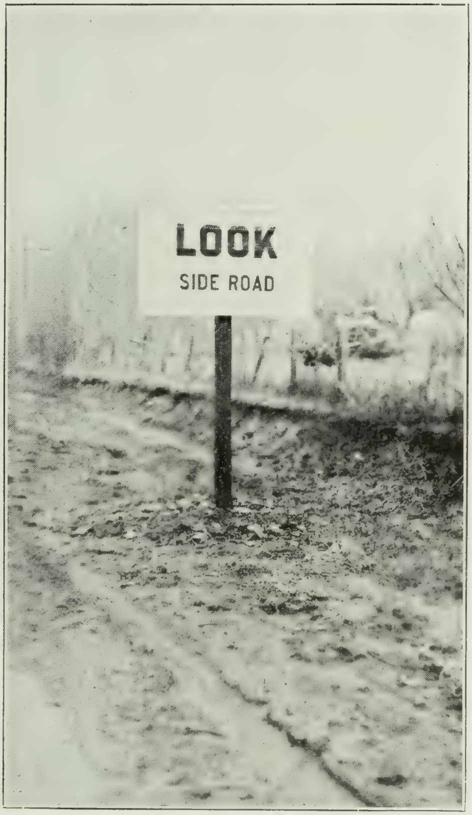
To accomplish the first purpose, wooden signs, 42 inches wide and 24 inches high, with black letters on a white background, are erected along the completed highways of the State road system. These signs, which are located 400 feet each way from every point of potential danger, are carried on four inches by four inches creosoted wooden posts, set

15 feet from the enter of the pavement on the right hand side; the bottom edge of the sign being four feet above the pavement.

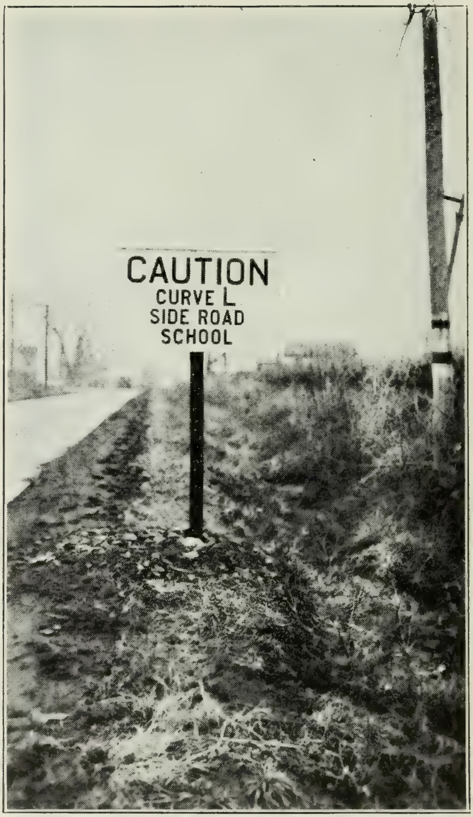
On all side roads and cross roads connecting with the improved State roads, the signs read "Danger—State Road."



The word "Danger" is painted red on a white background and the words "State Road" are painted in black. On the paved roads signs read "Look, Caution," or "Danger," depending upon the location.

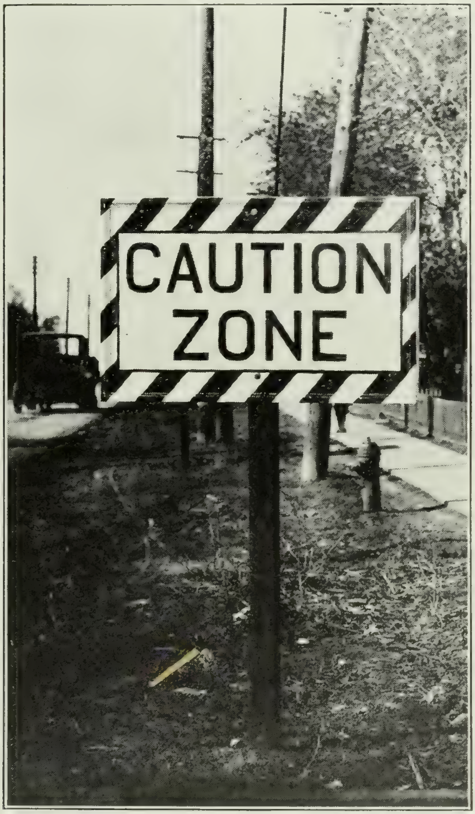


"Look" signs are erected where the driver need not slacken speed but should be on his guard.



"Caution" signs are erected where some slacking of speed and a certain degree of care is necessary.

"Danger" signs are to be used only where there is imminent danger, that is, where extra precaution should be taken and speed greatly reduced.

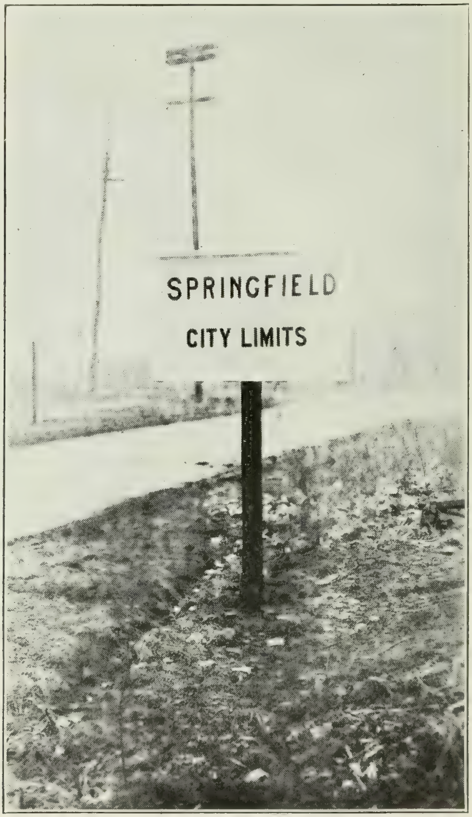


Where continuous care for a certain distance is necessary because of the frequency of cross roads, curves, narrow bridges, schools, etc., caution zones have been established. Such zones are marked at each end with a board sign lettered "Caution Zone." These signs have a border of diagonal black and white stripes approximately two inches in width.

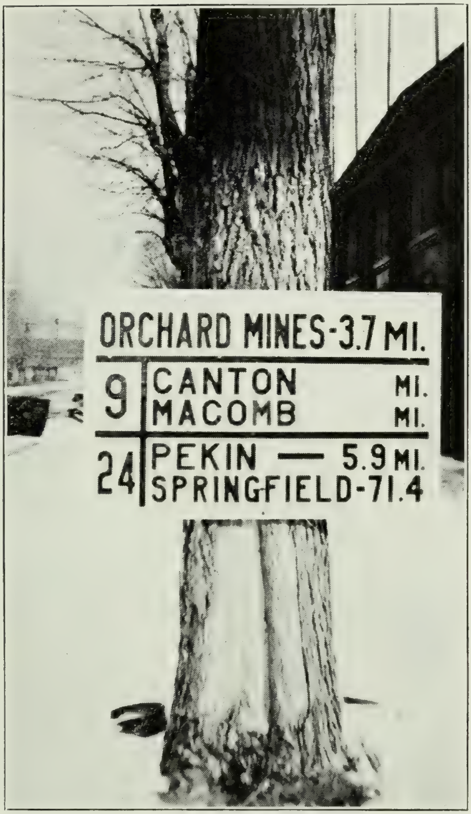
TO GUIDE THE TRAVELING PUBLIC.

To accomplish the second purpose—that of furnishing information to the traveling public, the following system has been adopted.

First, at the corporate limit of each city and village, a sign board of the same size as those carrying the warning signs is erected.



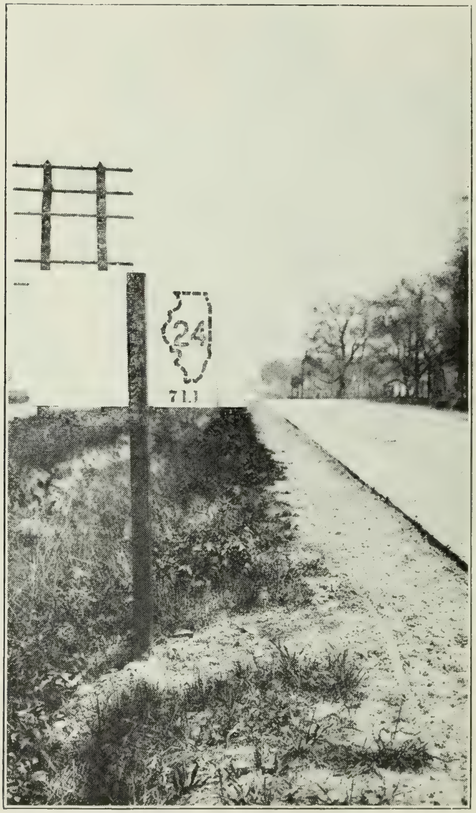
The name of the city and the words "City Limits" appear on that side of the sign faced by the traveler when approaching the city.



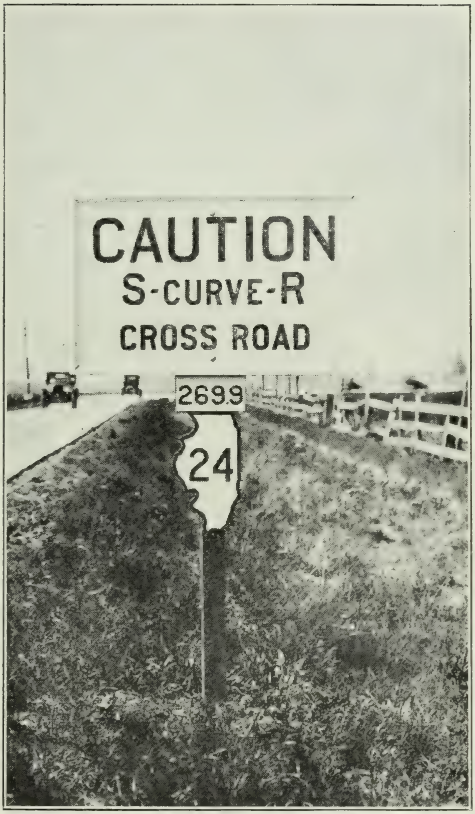
At the corporate limit there is erected, on the right hand side of the road as the traveler leaves the city, a sign on which is lettered the name of the next town and the distance thereto; also the name of the next principal objective point on the route and the distance thereto.

Second, all State routes are numbered. The back of each warning sign carries this number. On these signs the borders of the State are outlined in black; and within this outline the route number appears in black numerals. Inasmuch as two warning signs are erected at each cross road and each side road on the State system of highways, the traveler is advised at frequent intervals of the number of the route on which he is traveling.

In addition to the route number, by means of red numerals, the distance along the route from its northerly or easterly terminus is noted on each rural warning sign in miles and tenths of miles.

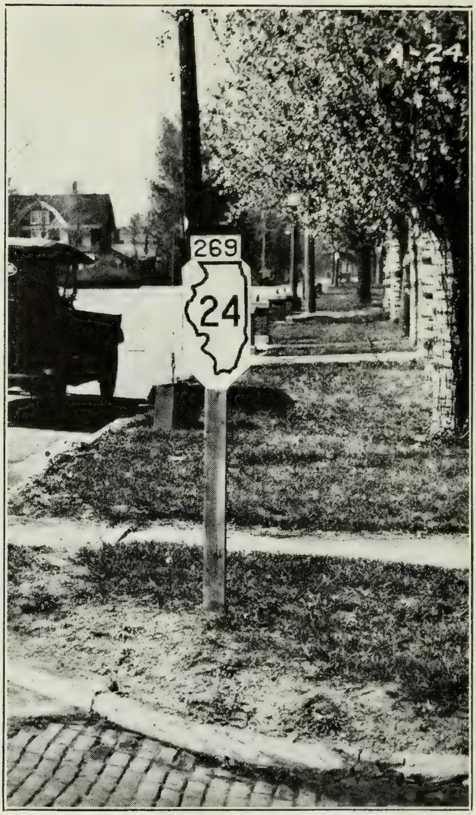


At all cross roads and side roads leading to nearby cities and villages, an aluminum plate appears just below the sign board.



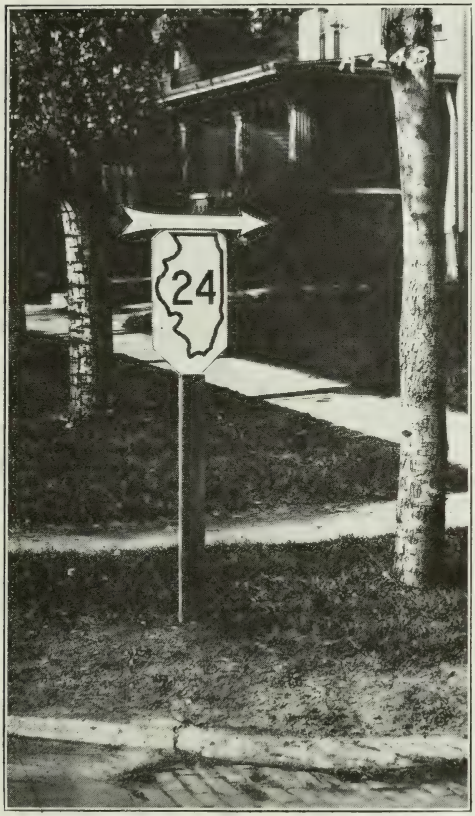
On this aluminum plate the State borders are outlined, as before described, with the route number in raised black numerals and the mileage in raised red numerals.

MARKING THROUGH CITIES.



No warning or danger signs appear within the corporate limits of the cities and villages; therefore aluminum markers showing the route and mileage (even miles only) erected on independent posts are used at street intersections to direct traffic.

Three different patterns are in use for the city markers, all of which have in common a double faced flat plate showing the State outline in black and the route number in raised black numerals.



At turns an arrow pointing in the proper direction appears above the standard plate. One or the other of these designs is erected at each pavement intersection on the same side of the intersecting street.

STATE HIGHWAY PATROL OFFICERS.

The Illinois Motor Vehicle Act provides that the Department of Public Works and Buildings is authorized to appoint a sufficient number of State highway patrol officers to enforce certain provisions of the Motor Vehicle Act. During the first part of the year of 1922 a number of men were appointed as highway patrol officers. This number has been increased from time to time until at the present the organization consists of one chief and twenty men.

Of the duties assigned to these men the first in importance is the detection of overloaded trucks, which have proved to be very injurious as well as destructive to our pavements. It is the duty of the patrol officers to weigh all trucks that do not comply with the provision set forth in the Motor Vehicle Act in regard to weight, width of tires, etc.

Second in importance is the arrest of parties found guilty of careless or reckless driving.

During the year 1922 there were 898 speeders warned; 925 trucks weighed, of which 213 were found to be overweight, resulting in 420 arrests.

TRAFFIC LINE.

After the adoption of the standard section providing for the construction joint down the center of our newly constructed pavement, it became very evident that this joint would have to be poured with asphaltic or other material the same as all other construction and contraction cracks. An experiment was carried on whereby a strip of five inches of asphaltic material was poured, which not only protected construction joints, but served as a traffic line. After a careful examination it was found that this traffic line was very beneficial to the traveling public thus enabling them to better judge their position and distance on the pavement.

The greater part of the Federal Aid roads were marked in this manner last year and arrangements have been made to so mark all pavements this year.

BUREAU OF MATERIALS.

A marked increase in volume of work under the direction of the Bureau of Materials was noticed in the year 1922. Practically every branch of activity in this bureau shows a growth of 100 per cent over the year previous, in spite of the fact that the inspection work was directly affected by the coal and rail strikes.

Inspection of materials was conducted along the same lines as in 1921, inspectors being stationed at the various plants furnishing sand, gravel, stone and cement. District engineers of materials were in direct charge of the inspectors located in their particular districts and contributed much to the development of a smooth running organization. Check up tests on all materials were made in the main laboratory, as well as tests on paints, asphalts, creosotes, tars and brick.

The increased use of road oils by the counties of the State induced the bureau to place chemists at a number of the oil refineries that shipped material in large quantities. Refineries which did not ship large amounts of this material submitted samples to the main laboratory for tests. During the past year 33,000,000 gallons of road oil were analyzed for application on Illinois roads. The cost of inspection of this material was .00024 cents per gallon or approximately .32 per cent of the cost of the material. The inspection service on road oils was entirely free of cost to the counties, it being considered as a form of cooperation in keeping with the policy of the department.

The maximum number of inspectors in the field during the year was 74 and the maximum number of plants at which inspection was maintained was 144. The following table illustrates the increase in inspection activities:

	1921	1922
Cement (barrels)	1,275,000	2,917,066
Aggregates (cubic yards)	1,010,000	2,143,045
Steel (pounds)	*6,000,000	32,700,000

* Records incomplete.

An estimate on the cost of inspection of unit quantities shows a decrease over the cost of inspection in 1921. Inspection cost of cement per barrel in 1921 was estimated at $.0168; in 1922 this cost was $.0120. Inspection cost of aggregates per cubic yard in 1921 was $.0660; in 1922 the cost was $.0608.

In spite of the decrease in per unit inspection cost the cost of inspection in percentage of the construction cost is slightly higher for 1922 than for 1921 due to the decrease in construction cost in 1922. In 1921 with a mile of road estimated to cost approximately $28,000.00, the percentage of inspection cost to construction cost was 83 per cent. In 1922 the cost of a mile of road decreased to approximately $26,000.00 with the result that the percentage of inspection cost to construction cost increased to 90 per cent.

Besides the regular course of instruction which is given each inspector before he is sent to the field, the bureau has endeavored to keep all men in the field well informed of matters which might help them in their work. With this idea in mind the bureau has prepared a manuscript, known as "The Field Inspectors Handbook." The booklet contains in detail the particular tests which must be made on materials, the object of the tests made on all kinds of pavement material, the problems which might be met in the field and the practical way to solve them, and many other points dealing with the policy of the department. As a help to the contractors, county highway officials and State engineers, the bureau has prepared a bulletin entitled "Survey of Commercial Plants Producing Concrete Aggregate for Highway Construction in Illinois." This bulletin furnishes detailed information which would otherwise take considerable time to obtain. The demand for this booklet has been exceedingly large and well illustrated the need of such a publication.

Through its many investigational projects the Bureau of Materials has secured for itself a most enviable reputation in research circles. The growth of the experimental work has been such as to embrace practically all branches of highway research, including both the laboratory and field phases. The space provided for this sort of work in the laboratory failed to prove sufficient and it was necessary to move the majority of the work to the State Fair Grounds. Though considerable room was available there, the advent of the State fair necessitated the moving of the investigational work and to provide against further contingencies of this sort it was decided to construct quarters to house the experimental work permanently. On a large plot of land at the corner of First and Ash streets, on which a lease had been obtained, a portable wooden building was erected by laboratory employees. Due to the fact that the laboratory is called upon to store the paint and asphalt which is furnished the contractors a former army "knock down" building was also assembled to serve as a storage room. The wide acreage available under the lease provides sufficient room for investigations involving the use of as many specimens as may be desired. An idea of the investigations which were carried to completion last year is contained in the following list:

(1) Curing concrete.
(2) Comparative strength tests of eleven standard cements.
(3) Gradation of aggregates.
(4) Setting of concrete under low temperatures.
(5) Curing of concrete under low temperatures.
(6) Value of various types of novaculite as concrete. Aggregate.
(7) Effect of hydrated lime in concrete.
(8) Effect of calcium chloride on setting time of various cements.
(9) Effect of calcium chloride on strength of various cements.
(10) Tests of effect of Hard-N-Tyte on surface hardness of concrete.
(11) Effect of segregation on various gradations of aggregates.
(12) Effect of hardness of stone on transverse strength of concrete.
(13) Moisture content of Bates road soil at various seasons.
(14) Effect of impact on road slabs.
(15) Soil movements under loads.
(16) Effect of tile drainage on moisture content of subgrades.
(17) Production of a red paint which resists weathering.
(18) Development of a cement colored crack and joint filler.
(19) Viscosity investigations of road oils.

Though a great many investigations were carried on in 1922, the program of this work for 1923 contains some extremely important investigations. As outlined for the present, the following gives an idea of the work to be undertaken:

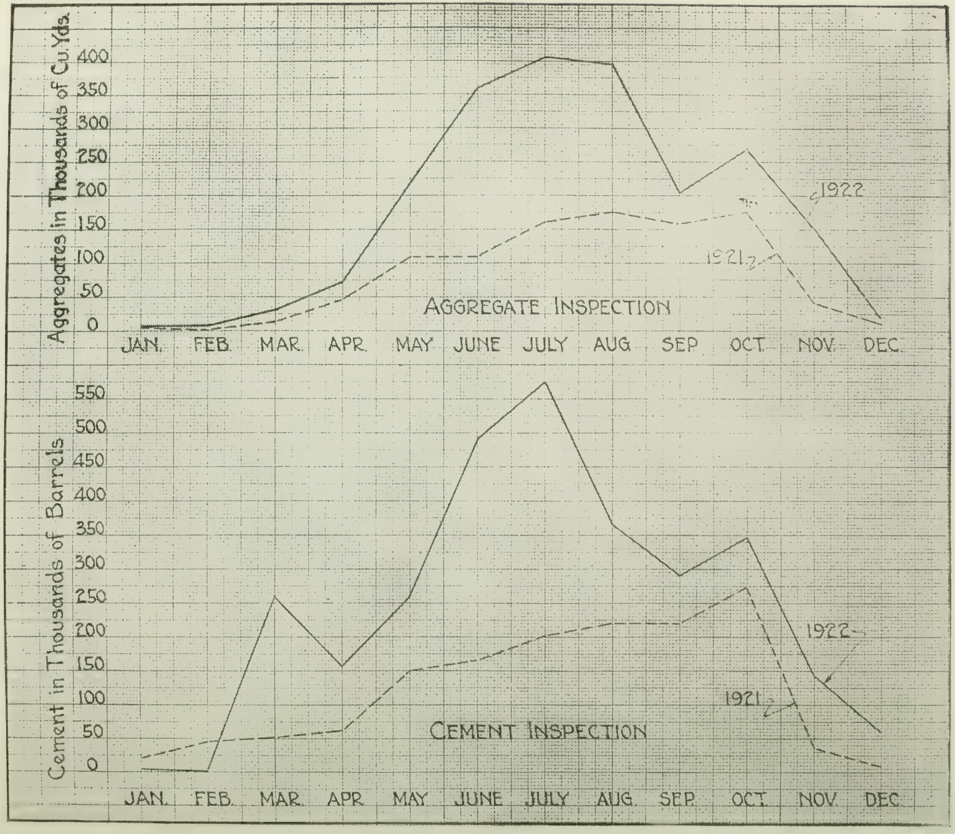
(1) Chemical and physical effects of calcium chloride as a hydrating agent in various cements.
(2) Study of "Recast" chemical analysis of cement.
(3) Investigation of patented material used as a protective agent and bond preventor on reinforcing bars.
(4) Static fatigue of concrete.
(5) Impact fatigue of concrete.
(6) Repeated load fatigue of concrete.
(7) Testing of constant stress beams for true modulus of elasticity.
(8) Wear tests on surface cured and incorporated calcium chloride concrete specimens.
(9) Effect of impact on rerolled reinforcing bars.
(10) Corrosion of reinforcement in calcium chloride incorporated concrete specimens.
(11) Use of stone screenings as fine aggregate.
(12) Effect of GF12 (patent solution) on placing concrete in low temperatures.
(13) Determining relation of curling of concrete beam to the movement of temperature through the same.
(14) Effect of sand gradation on mortar strength.
(15) Study of moisture content and bearing power of various types of soil found in Illinois subgrades.
(16) Experimental oiled roads in Henry and Christian Counties.
(17) Investigation of colored cements used for decorative purposes on bridges.

The value of the investigational work is seen in the changes in specifications, the introduction of the use of new materials and the change in design of pavements, all of which go to produce a better road at a less cost.

The photographic department of this bureau, organized merely as a temporary arrangement to take care of the Bates Road pictures, has grown to such size that it works for the entire Division of Highways. Not only is printing and developing done but also enlarging, reducing, portrait and color work is produced in this department. A considerable saving has been experienced in the present arrangement in both time and money.

As a means of keeping men in the field acquainted with the work of the laboratory, the publication of a monthly news letter was inaugurated last year. Starting with a mailing list of 50 this news letter has increased in circulation to approximately three hundred copies. "Straight from the Laboratory" as this publication is known has on its mailing list not only employees of the Bureau of Materials but also employees of all bureaus in the division, County Superintendents of Highways and many practicing highway engineers and contractors in this State.

In the way of general education, the bureau contributed three large highway exhibits which traveled over the State attending the majority of county fairs. It is estimated that a quarter of a million people came in contact with these exhibits.



Curves showing comparisons in monthly inspection activities in 1921 and 1922.

BUREAU OF MACHINERY.

The duties of the Bureau of Machinery may be given as follows:

To receive surplus war materials alloted by the United States Department of Agriculture to the State of Illinois, Division of Highways.

To place in good mechanical condition all mechanical supplies which are to be used by the Division of Highways, State institutions, and the equipment which will be used for rental to contractors having State or Federal aid road contracts.

To repair and distribute trucks which are to be rented to counties, townships, municipalities and institutions.

To maintain a system of inspection of the mechanical equipment owned by the Division of Highways. Inspectors make periodical trips to determine whether the equipment is kept in good condition and to advise the lessees on the care and operation of the equipment under lease.

To keep a system of records of all of the material received from the United States Department of Agriculture and to make a report of same to the United States Government concerning its use and disposal.

Some idea may be given of the vast amount of materials received from the United States Government and its approximate value from the following tabulatnon:

1. Trucks, 1,065; estimated value	$3,265,679.00
2. Passenger cars, 204; estimated value	40,000.00
3. Miscellaneous equipment—	
6,000 tons steel rail.	
80 24-in. gauge flat cars.	
16 24-in. gauge locomotives.	
12 standard gauge locomotive cranes.	
100,000 yards of canvas.	
750,000 board feet of lumber.	
75 tractors, etc.; estimated value	2,107,054.10
4. Motorcycles, 134; estimated value	30,202.00
Total	$5,442,935.10

The larger portion of the material were received in the years of 1919 and 1920, but owing to the fact that some of it has seen extensive service, a portion has been surveyed and declared unserviceable. It is estimated that its present inventory value would not exceed 50 percent of the amount shown above or $2,817,376.55.

SUMMARY OF INCOME AND EXPENSES OF THE BUREAU OF MACHINERY.
JANUARY 1—DECEMBER 31, 1922.

Cash Items—	
Sale of repair parts, etc	$13,522.52
Received from counties for truck rental	42,116.68
Received from State departments, account equipment rental	6,487.48
Received from contractors, account equipment rental	13,221.86
Total cash items	$75,348.54
Non-Cash Items—	
Contractors equipment rental accruals outstanding	$32,274.97
County equipment rental accruals outstanding	6,975.00
State department equipment rental accruals outstanding	7,594.05
Total non-cash items	$46,844.02
Miscellaneous Credits—	
Credit by trucks furnished counties on contractors' rental basis, with cash and non cash items deducted	$366,108.32
Credit by equipment furnished State departments on contractors' rental basis with cash and non cash items deducted	69,518.47
Credit by equipment furnished Bureau of Maintenance on rental basis	188,747.22
Credit by equipment furnished Bureau of Construction, for use on Bates test road, on rental basis	60,285.15
Credit by equipment furnished Bureau of Construction, for use on day labor jobs on rental basis	86,143.70
Credit by equipment furnished Bureau of Tests on rental basis	20,030.70
Credit by passenger cars and motorcycles furnished districts	65,234.14
Total miscellaneous items	$856,067.70
Total income for the Bureau of Machinery	$978,260.26
Expense in handling, storing, shipping and maintaining equipment	$345,035.03
Leaving as a net operation profit for the Bureau of Machinery	$633,225.23

BUREAU OF AUDITS.

This bureau, as its name implies, has charge of the auditing and accounting for all classes of road and bridge work which are constructed by or under the supervision of the Division of Highways. The work of the bureau involves the handling of payrolls, purchases, miscellaneous bills, expense accounts, contractors' payment estimates, checking of finances with contractors, preparing, checking and recording of contracts and bonds in connection with road work, passing upon and securing opinions covering legal points brought to the attention of the division by various townships, counties and other parties having to do with road matters, handling of great volume of correspondence, recording and acknowledging liens and claims filed against contractors, handling of supplies furnished to the various sections of the division, collection of moneys due the Division of Highways, keeping a record of the finances with various counties as far as State Aid work is concerned, preparing and recording reimbursement vouchers covering amounts due Illinois from the Federal government under Federal aid, handling of incoming and outgoing shipments of supplies and equipment, preparing of blue prints for road and bridge work, filing of tracings, and the checking, recording and following up of the distribution of cement which is furnished by the State to the various road contracts.

CONTRACTORS' BONDS AND FINANCES.

All bonds, either personal or surety, furnished by contractors are checked for legal requirements as well as to see that they are properly filled out. The financial condition of contractors is also investigated prior to the awarding of contracts.

PERMITS, FRANCHISES, ETC.

All matters pertaining to franchises, permits or other permission to make use of the State highways are approved by this bureau after being carefully scanned both as to permissibility and as to legal aspects.

LIENS AND CLAIMS.

All liens and claims which may be filed by material producers, laborers or other parties against contractors on State road work are filed and recorded in this bureau.

CONTRACTORS' PAYMENT ESTIMATES.

The average monthly expenditures to contractors on payment estimates for the year 1922 is $1,500,000.00 or an approximate total for the year of eighteen million dollars.

VOUCHERS.

Cement vouchers to the extent of 6,000 per year are handled through this bureau covering a distribution of cement to possibly two hundred and fifty road sections, involving 3,000,000 barrels of cement annually.

All vouchers covering requests for reimbursement from the Federal Government under the Federal Aid Act are prepard and handled through this bureau.

The bureau handles monthly twenty-five payrolls covering approximately eight hundred and twenty-five employees who are distributed between nine districts and six bureaus. The service record of each man is also kept in this office.

This bureau is handling approximately thirty thousand vouchers per year covering miscellaneous engineering, administration and overhead expense.

All supplies and equipment desired by any section of this division are requisitioned through the Bureau of Audits.

Approximately five thousand expense accounts per year are received in this bureau where they are carefully analyzed, checked for mathematical correctness, scheduled, recorded and forwarded for payment.

This bureau prepares all financial estimates and reports which are made to the Superintendent of Highways, the Director of the Department of Public Works and Buildings, the Department of Finance, and the Governor. The amount of money involved in these estimates and reports can be better gauged when it is stated that approximately sixty per cent of the entire money being spent by the State of Illinois in all its various departments and activities originates by voucher in this office.

HIGHWAY STATISTICS.

This bureau is being constantly called upon to furnish statistical information not only to the various State officials and legislators but also to other State highway departments, as well as numerous individuals, corporations and companies. This branch of the work alone is considerable since it is found in this line of work statistics may be prepared or called for in innumerable ways, necessitating considerable time in preparation.

This bureau handles all the blue printing for the various Bureaus of this division as well as for the nine districts. The amount of blue printing paper and tracing cloth which is purchased in one year's time will approximate six thousand dollars. This amount of supplies will furnish enough for approximately nine hundred miles of road.

All supplies and equipment are handled in this bureau and are distributed as requested to the various other bureaus and districts. A record is kept of the distribution of equipment in order to enable the division to locate and identify same.

All incoming and outgoing shipments of supplies, engineers' equipment, and equipment of other kinds are handled through this bureau as well as the packing, unpacking, distributing to the various bureaus, storing, etc.

The following represents a statement of appropriations available January 1, 1922, and the expenditures for the calendar year of 1922. It also represents the balances on hand at December 31, 1922:

STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS—FROM JANUARY 1, 1922 TO DECEMBER 31, 1922.

Month.	Engineering Revenue.	Construction Refunds.	Maintenance Revenue.	Equipment Revenue.	Totals.
January	$1,691 78	$1,428 77	$ 492 62	$ 4,933 41	$ 8,546 58
February	335 61	3,432 02		5,393 63	9,161 26
March	454 68	359 26	15 00	5,006 77	5,835 71
April	39 25			3,015 33	3,054 58
May	1,610 08	2,883 49	147 82	5,597 41	10,238 80
June	1,215 04	1,990 67	546 23	9,183 54	12,935 48
July	1,978 79	1,982 60	1,448 03	8,064 21	13,473 63
August	2,167 54	3,261 20	36 36	8,394 37	13,859 47
September	4,037 61	5,379 90	1,434 00	10,638 33	21,489 84
October	930 96	7,307 00	1,057 51	4,922 49	14,217 96
November	368 38	70 16	552 23	5,214 22	6,204 99
December	170 55	1,460 80	1,682 33	4,909 53	8,223 21
Totals	$15,000 27	$29,555 87	$7,412 13	$75,273 24	$127,241 51

APPROPRIATION STATEMENTS.

Appropriation.	Balance January 1, 1922.	Available July 1, 1922.	Expended during 1922.	Balance December 31, 1922.
52d Omnibus	$ 40,195 19	$96,750 00	$ 86,068 53	$ 50,876 66
State Aid	213,267 32		32,785 91	180,481 41
State Highways	15,473,348 78		6,837,603 37	8,635,745 41
State Bond	27,538,999 35		12,420,711 49	15,118,287 86
Maintenance	2,774,262 92		640,486 78	2,133,776 14
County Refunds Road Fund	3,170,109 05		1,798,184 50	1,371,924 55
County Refunds Bond Fund	2,861,289 87		637,820 93	2,223,468 94
Totals	$52,071,472 48	$96,750 00	$22,453,661 51	$29,714,560 97

DISTRIBUTION OF EXPENDITURES—BY FUNCTIONS.

Account.	Amount.	Per cent.
Administration and engineering	$ 1,421,553 53	6.33
Construction	20,009,672 49	89.12
Maintenance	640,503 01	2.85
Equipment	381,932 48	1.70
Total	$22,453,661 51	100.00

DISTRIBUTION OF EXPENDITURES—BY STANDARD ACCOUNTS OF FINANCE DEPARTMENT.

Account.	Amount.	Per cent.
Salaries and wages	$ 1,456,464 74	6.49
Office expense	50,628 25	.23
Traveling expense	261,985 32	1.16
Operation	568,222 22	2.53
Repairs	75,196 23	.33
Equipment	31,492 26	.14
Permanent improvements	20,009,672 49	89.12
Totals	$22,453,661 51	100.00

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SIXTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

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January 1, 1923
TO
December 31, 1923

AUG. 26TH 1818

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FRANK T. SHEETS,
Superintendent of Highways
CLIFFORD OLDER,
Chief Highway Engineer

[Reprinted from the Sixth Administrative Report. Printed by authority of the State of Illinois.]

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DIVISION OF HIGHWAYS.

FRANK T. SHEETS, *Superintendent of Highways.*
CLIFFORD OLDER, *Chief Highway Engineer.*

Illinois greatly surpassed the world's record breaking accomplishments of the year 1922 by building during 1923 a total of 1,085 miles of durable hard surfaced roads, of which 876 miles are located on the State bond issue system. The significance of this bare statement cannot be realized until this mileage is superimposed upon the map of the United States. Then it is found that the year's accomplishments in road building, if joined into a continuous highway, would reach from Chicago to a point in the Gulf of Mexico 260 miles south of New Orleans, or from Chicago to a point in the Atlantic Ocean 370 miles east of New York, or would span four-tenths of the entire distance from the Atlantic to the Pacific Ocean.

This performance was made possible by letting contracts for road building in the fall of 1922 and the early months of 1923, thus enabling contractors to set up their plants and store materials in preparation for the construction season. Vast quantities of cement, sand, gravel, and stone were stored during the spring months, with the result that no trouble from material shortages, car shortages, or similar untoward conditions was encountered. Every available construction day was utilized for actual paving operations—not for preliminary work.

During the season, 199 large paving mixers, 11,000 men, and 3,000 teams were operating throughout all parts of the State. Construction attained a maximum rate of 58 miles per week or approximately one mile per working hour. The world's record of 2,017 feet of 18-foot pavement was laid with one paving mixer in one day.

These facts serve to drive home to the people of Illinois the realization that each year the highway transportation facilities of our commonwealth are being substantially enlarged, and that Illinois is literally being lifted out of the mud.

In Figure 3 there is shown the mileage of pavements laid per year from 1914 to 1923 inclusive. A sharp contrast may be noted in the accomplishments of the years 1921, 1922, and 1923 as compared with the previous years. The total mileage built during the entire ten years amounts to 3,435 miles, of which 65 per cent has been completed during the past three years, or, to state the situation in another manner, the mileage built during the past three years under the administration of Governor Len Small is almost double the mileage completed during the preceding seven years. This may be visualized by a comparison of Figures 1 and 2, which show the highway development of Illinois as of January 1, 1921 and as of December 31, 1923.

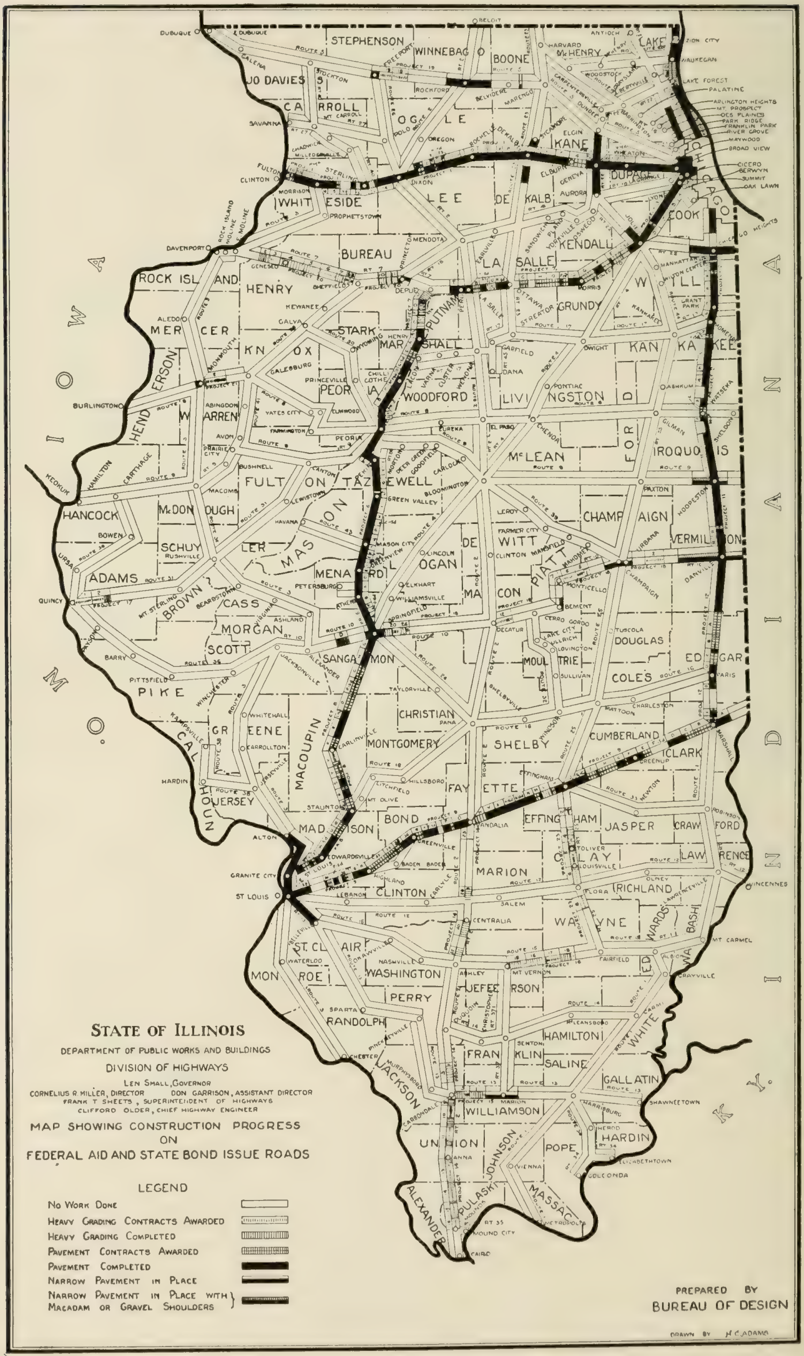


Figure 1.—As Illinois looked January 1, 1921.

highway bonds, principal and interest to be paid by motor licenses fees without direct taxation, for the purpose of completing the original $60,000,000 State bond issue system and adding thereto approximately 5,100 miles, making a total highway system of approximately 9,800 miles when completed.

This recommendation was received very favorably by the General Assembly. A carefully thought out system of highways was developed and the law was passed by an overwhelming majority of both houses.

At the present writing, practically all of the funds provided for by the original bond issue as well as surplus motor fees and Federal aid funds available for the year, 1924 have been obligated or will be obligated within the next few weeks by contract. The necessity of adopting the proposed bond issue becomes more and more apparent. If adopted by the people in November, 1924, this legislation will insure to Illinois the continuation of the rapid construction of highways, to the end that Illinois within the next few years will be one of the best paved states in the Union.

In the spring of 1923, the traffic tests of the Bates experimental road were carried to a conclusion. The outstanding result of this final test was that the standard design now used by the Division of Highways came through the incessant hammering of 51,000 round trips of heavily loaded trucks without a single break. Of this amount of traffic, 35,000 round trips were made with trucks carrying the legal load or greater, and the final load applied was 62½ per cent above the legal limit. This shows clearly that there need be little apprehension regarding the safety of Illinois highways when truck loads are properly controlled. There is an adequate factor of safety in the present design as evidenced by the results of the above mentioned test.

In the following pages will be found a detailed report of the various bureaus of this division. On account of the fact that the work of this division naturally arranges itself by calendar years, all statistical information is based on the calendar year of 1923.

BUREAU OF DESIGN.

SURVEYS AND PLANS.

On the original $60,000,000 State bond issue system, nearly all of the surveys for the various routes had been completed on January 1, 1924 with the exception of portions of a few routes where the locations had not been definitely decided. Such survey work as remains uncompleted will probably be completed during the year 1924.

The preparation of plans covering surveys which have been made is carried forward as rapidly as possible, it being the intention to keep a designing force in each of the district offices at all times adequate to keep plan work in progress throughout the entire year.

CONTRACTS AWARDED.

The following tables show the contracts for road work which have been awarded from 1914 to 1923, inclusive, on the Federal aid, State bond issue and State aid systems.

TABLE I—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1914	----	----	----	----	----	----	----	----
1915	----	----	----	----	----	----	----	----
1916	----	----	----	----	----	----	----	----
1917	----	----	----	----	----	----	----	----
1918	----	----	----	----	----	8.36	$ 201,619.40	$24,131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401 77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47.57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1,488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5,818.01	83	901,884.69	472.05	12,634,976.84	26,766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23,123,159.60	26,617.20
Total	859.97	$8,186,023.04	$9,518.96	579	$6,882,661.73	2,494.13	$71,171,684.68	$28,535.68

NOTE.—Grading and bridge work shown does not necessarily coincide with the pavement shown A great deal of the grading shown in this table is as yet unpaved.

TABLE II—STRAIGHT STATE AID CONTRACTS AWARDED (DOES NOT INCLUDE 15D WORK).

Year.	Earth roads.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1914	----	----	----	7	$ 815.00	91.61	$ 963,216.54	$10,514.32
1915	1.75	$ 21,643.58	$12,367.76	308	178,708.65	74.65	738,623.55	9,824.49
1916	186.11	401,613.65	2,157.94	90	62,953.19	97.34	1,212,655.01	12,457.93
1917	181.13	412,056.55	2,274.92	90	77,281.66	90.57	1,333,000.12	14,717.90
1918	----	----	----	5	44,288.00	2.75	73,708.35	26,803.04
1919	71.10	262,394.20	3,690.50	36	51,588.00	52.08	1,136,920.79	21,830.28
1920	2.76	29,571.32	10,714.25	5	11,890.00	3.48	99,793.61	28,676.32
1921	2.22	9,981.22	4,496.05	19	22,130.33	2.76	46,104.45	16,704.51
1922	.27	3,334.65	12,350.56	5	2,705.00	2.98	49,264.70	16,531.78
1923	----	----	----	----	----	----	----	----
Total	445.34	$1,140,595.17	$2,561.18	565	$452,359.83	418.22	$5,653,287.12	$13,517.50

NOTE.—Table shows total cost, one-half of this cost was paid by county and one-half by State. Pavement includes all types and widths.

CONTRACTS AWARDED BY COUNTIES UNDER SECTION 15d OF THE ROAD AND BRIDGE LAWS.

Under the provisions of Section 15d of the Road and Bridge Laws any county may construct State aid roads more rapidly than its allotment of State aid money will permit, provided the entire cost of such construction is paid with county funds at the time the improvement is made. Such county then has the right either to use any allotment of money made to it by the State to defray one-half the cost of constructing new State aid roads, or to apply such money on the payment of any bonds or other obligations which have been incurred for the construction of State aid roads at its own expense.

Several counties have operated under the provisions of this law during the past year. Plans, specifications, estimates and contracts for such work must be approved by the Department of Public Works and

Buildings, which also gives the work general supervision during construction.

From January 1, 1923 to January 1, 1924 the work shown in Table III was placed under contract by the various counties.

TABLE III—CONTRACTS AWARDED FOR COUNTY 15D WORK—1923.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Champaign			4	$ 19,278.18	36,027	$590,847.97	$610,126.15
Cook	7,697	$94,846.85	6	454,841.88	12,737	398,381.12	948,069.85
Douglas					12,647	208,785.83	208,785.83
DuPage					6,538	44,873.79	44,873.79
Effingham					0.212	3,750.16	3,750.16
Grundy					3.116	68,813.28	68,813.28
Iroquois			1	6,437.66	24.406	379,257.43	385,695.09
Kane					10.429	302,292.72	302,292.72
Kankakee					9.976	143,399.62	143,399.62
Lake	1.053	18,861.36	2	36,711.71	2,541	73,007.97	128,580.04
Lee					8.127	68,920.14	68,920.14
Livingston			1	48,076.80	1.002	17,485.18	65,561.98
Madison					7.352	205,967.45	205,967.45
Massac			3	3,582.00			3,582.00
Menard	0.882	6,768.16			1.980	52,068.04	58,836.20
Ogle					8.771	84,947.98	84,947.98
Peoria					1.536	42,850.32	42,850.32
Randolph			2	4,885.00			4,885.00
Rock Island					9.195	88,725.83	88,725.83
St. Clair	5.688	48,327.69	1	20,255.42	3.077	80,805.69	149,388.80
Vermilion					8.890	15,981.19	15,981.19
Whiteside					4.375	77,952.33	77,952.33
Will					12.180	205,325.21	205,325.21
Williamson			1	18,953.06			18,953.06
Winnebago			1	7,344.90	10.200	279,325.78	286,670.68
Totals	15.320	$168,804.06	22	$620,366.61	187.404	$3,433,764.03	$4,222,934.70

CROSS SECTIONS.

The various pavement cross sections used in highway work in Illinois have been changed materially during the past three years, because of the results obtained from the experiments on the Bates test road.

During 1919, contracts for concrete road construction were awarded on the basis of a cross section seven inches thick at the edges and eight inches thick in the center, with a flat subgrade. No reinforcing steel or joints of any kind were used.

From January 1, 1920 to February 4, 1921, all contracts for concrete road construction were based on a cross section with a uniform thickness of eight inches, without reinforcing steel or center joint.

On February 4, 1921, the first design of cross section resulting from the Bates road tests was adopted. This cross section had a uniform thickness of seven inches, with a longitudinal metal joint in the center of the pavement, and with longitudinal dowel bars in the edges of the pavement.

This cross section, with some modification of the guage and shape of the center joint, was used until October 25, 1922, when a cross section for concrete pavement having nine-inch edges and a six-inch central thickness was adopted. Except for some slight changes in the de-

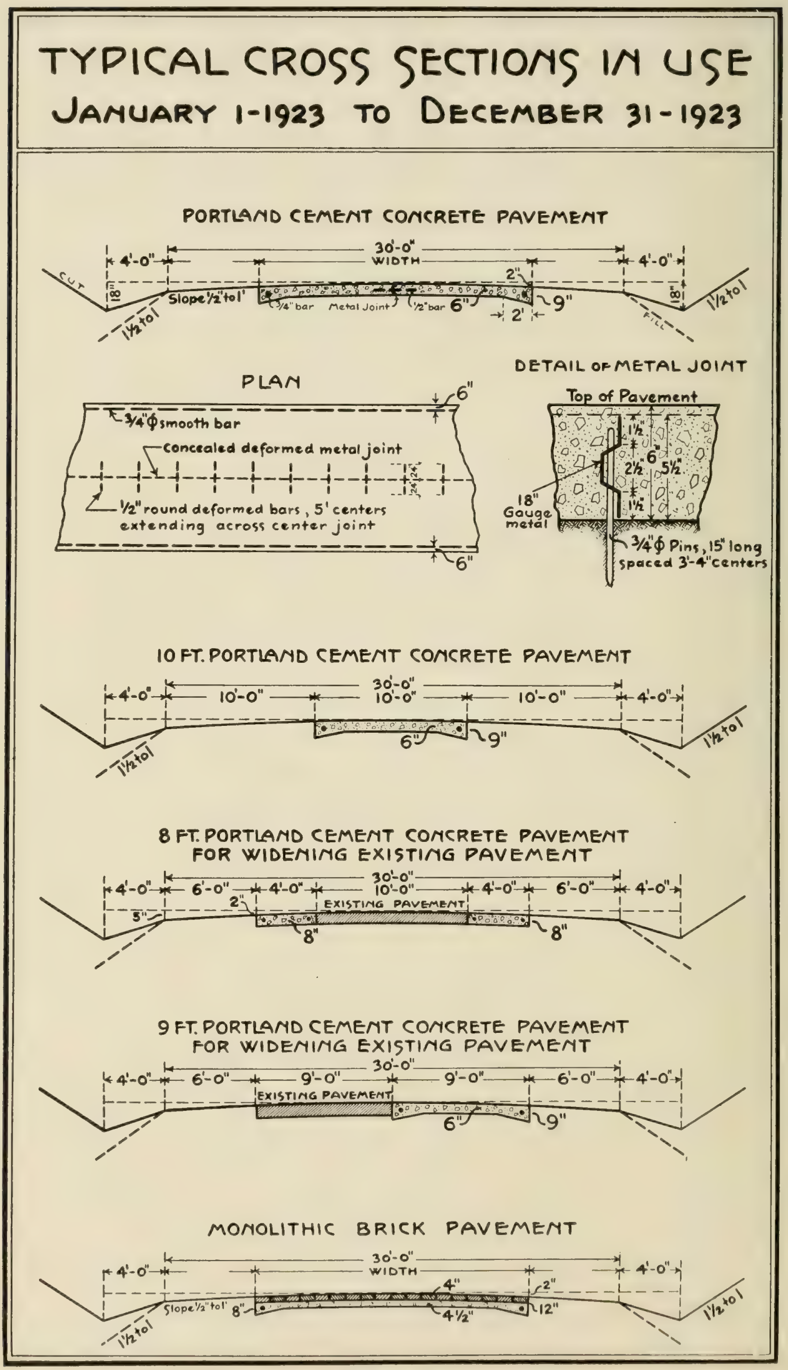

TYPICAL CROSS SECTIONS IN USE
JANUARY 1-1923 TO DECEMBER 31-1923
PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
WIDTH
4'-0"
4'-0"
CUT
18"
Slope ½" to 1'
1½ to 1
¾" bar
Metal Joint
½" bar
6"
2"
9"
2'
FILL
1½ to 1
PLAN
6"
¾"φ smooth bar
Concealed deformed metal joint
½" round deformed bars, 5' centers extending across center joint
24"
24"
6"
DETAIL OF METAL JOINT
Top of Pavement
1½"
6"
2½"
5½"
1½"
18" Gauge metal
¾"φ Pins, 15" long spaced 3'-4" centers
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
4'-0"
10'-0"
10'-0"
10'-0"
4'-0"
6"
9"
1½ to 1
1½ to 1
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
4'-0"
10'-0"
4'-0"
6'-0"
4'-0"
5"
2"
EXISTING PAVEMENT
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
9'-0"
9'-0"
6'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
MONOLITHIC BRICK PAVEMENT
30'-0"
WIDTH
4'-0"
4'-0"
4"
2"
Slope ½" to 1'
8"
4½"
12"
1½ to 1
1½ to 1

Figure 4.

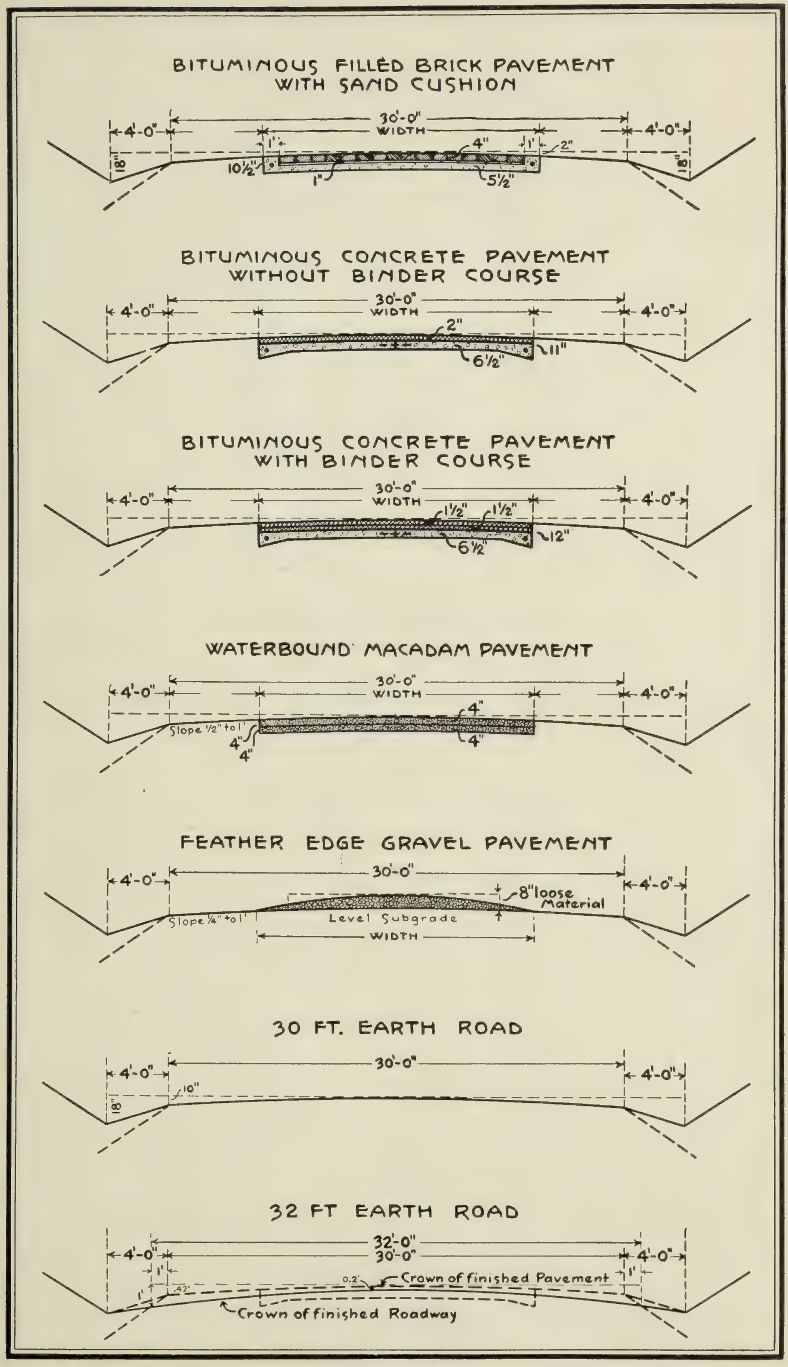

BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION
4'-0"
30'-0"
WIDTH
4'-0"
1'
4"
1'
2"
18"
10½"
1"
5½"
18"
BITUMINOUS CONCRETE PAVEMENT WITHOUT BINDER COURSE
4'-0"
30'-0"
WIDTH
4'-0"
2"
11"
6½"
BITUMINOUS CONCRETE PAVEMENT WITH BINDER COURSE
4'-0"
30'-0"
WIDTH
4'-0"
1½"
1½"
12"
6½"
WATERBOUND MACADAM PAVEMENT
4'-0"
30'-0"
WIDTH
4'-0"
4"
Slope ½" to 1'
4"
4"
4"
FEATHER EDGE GRAVEL PAVEMENT
4'-0"
30'-0"
4'-0"
8" loose Material
Slope ¼" to 1'
Level Subgrade
WIDTH
30 FT. EARTH ROAD
4'-0"
30'-0"
4'-0"
10"
18"
32 FT EARTH ROAD
32'-0"
4'-0"
30'-0"
4'-0"
1'
1'
.42'
1'
0.2'
Crown of finished Pavement
Crown of finished Roadway

Figure 5.

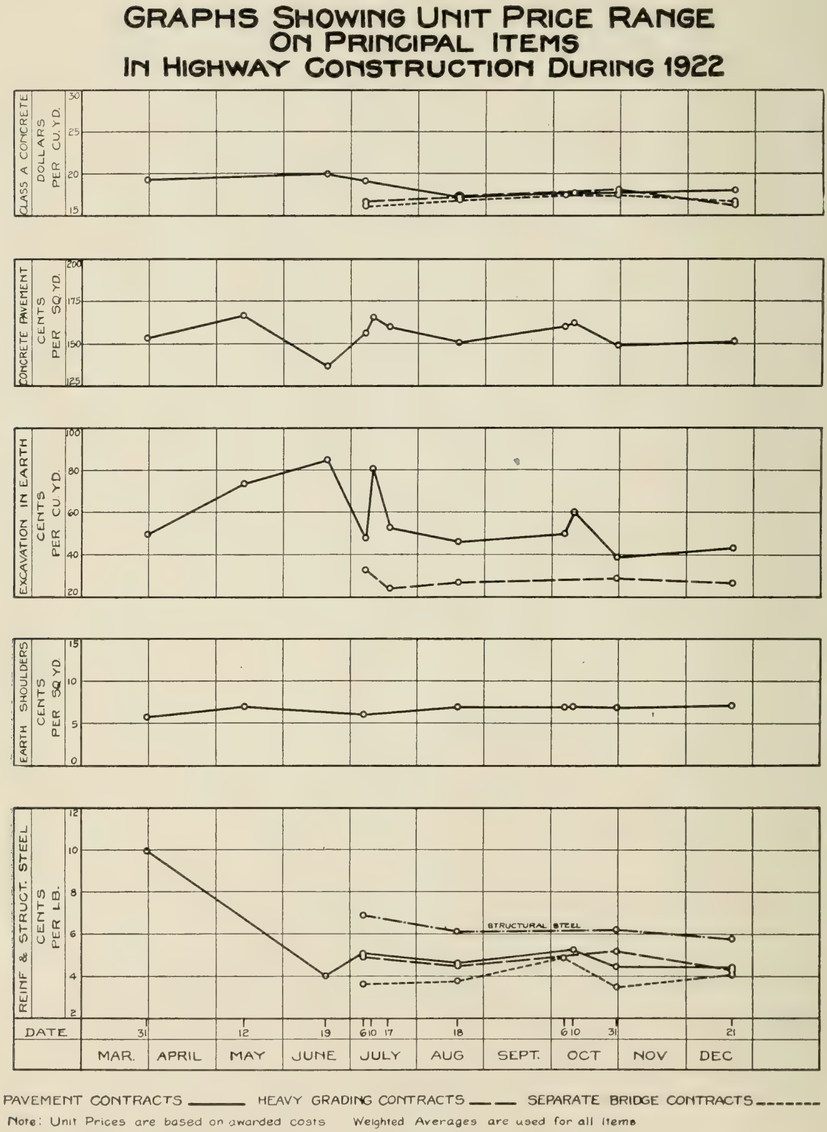
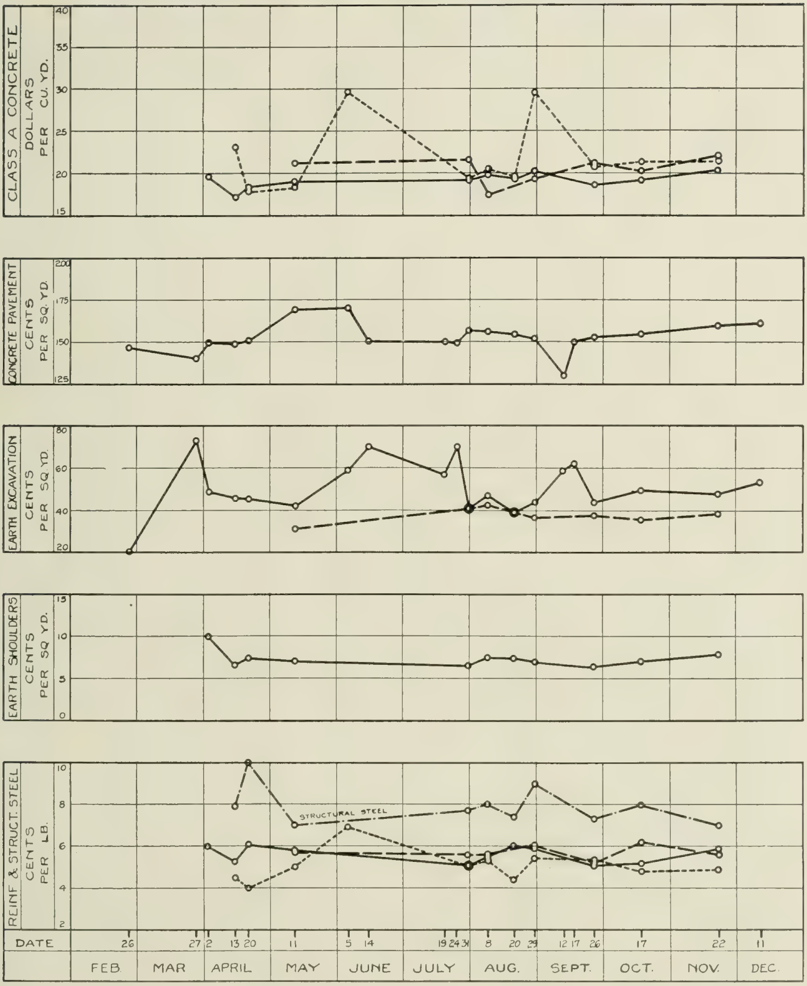

GRAPHS SHOWING UNIT PRICE RANGE ON PRINCIPAL ITEMS IN HIGHWAY CONSTRUCTION DURING 1922
CLASS A CONCRETE DOLLARS PER CU. YD.
30
25
20
15
CONCRETE PAVEMENT CENTS PER SQ. YD.
200
175
150
125
EXCAVATION IN EARTH CENTS PER CU. YD.
100
80
60
40
20
EARTH SHOULDERS CENTS PER SQ. YD.
15
10
5
0
REINF & STRUCT. STEEL CENTS PER LB.
12
10
8
6
4
2
STRUCTURAL STEEL
DATE
31
12
19
6 10 17
18
6 10
31
21
MAR.
APRIL
MAY
JUNE
JULY
AUG
SEPT.
OCT
NOV
DEC
PAVEMENT CONTRACTS
HEAVY GRADING CONTRACTS
SEPARATE BRIDGE CONTRACTS
Note: Unit Prices are based on awarded costs Weighted Averages are used for all items

Figure 6.

GRAPHS SHOWING UNIT PRICE RANGE ON PRINCIPAL ITEMS IN HIGHWAY CONSTRUCTION DURING 1923



PAVEMENT CONTRACTS ——— HEAVY GRADING CONTRACTS — — — SEPARATE BRIDGE CONTRACTS - - - - - -

Note: Unit Prices are based on awarded costs. Weighted Averages are used for all items

Figure 7.

sign of the metal center joint, this cross section has been used continuously since that date.

The various standard pavement cross sections now used by this department are shown in Fgures 4 and 5 of this report.

UNIT PRICES.

The fourth annual report of the Department of Public Works and Buildings, Division of Highways, contained graphs showing the unit price range of the principal items in highway construction during 1921. Similar graphs for the years 1922 and 1923 have been prepared and are shown in Figures 6 and 7. In comparing these graphs, it should be noted that they are all based on actual awarded costs. The points on the curves were plotted using the weighted average unit prices for the various items by lettings. These curves, therfore, may be taken as an accurate index of the range of prices throughout the year for the items shown. The unit prices for pavement and for concrete in drainage structures do not include cement.

CHANGES IN DESIGN.

Some of the most important changes in design which have been made during the year 1923 are:

1. Minimum width of pavement through cities and villages, widened in cooperation with the State. Prior to January 1, 1923, our policy called for a minimum width of 27 feet between curbs. On January 2, 1923, this requirement was changed from 27 feet to 30 feet between curbs. A 30-foot width between curbs permits the parking of vehicles along the curb, and still leaves an 18-foot space in the center of the street for traffic.

2. Sight distance. An investigation of our policy concerning the use of horizontal curves showed that in some cases a sufficient sight distance was not provided. Our vertical curve policy is based on a minimum sight distance of 400 feet and a similar policy was therefore adopted for horizontal curves in all cases wherever practical, either by increasing the radius of the curve or by "day-lighting" the cut on the inside of curves.

3. Horizontal curves. On March 1, 1923, a change was made in the policy concerning the use of horizontal curves. Instead of changing the length of radius of horizontal curves abruptly, as was done previously, provision was made for a more uniform variation for the various central angles. A diagram was prepared, on which was plotted radius and degree of curves for the various central angles, to be used as a guide in selecting the proper radius for the various central angles.

Other minor changes in design have been made but these do not merit mention in this report.

FEDERAL AID.

Table IV shows all Federal aid allotments which have been made to the State of Illinois.

TABLE IV.—FEDERAL AID ALLOTMENTS.

	$75,000,000 FUND.		
Fiscal year ending June 30,	1917	$ 220,926.23	
	1918	441,852.46	
	1919	658,323.48	
	1920	874,220.26	
	1921	1,091,266.98	
Sub-total			$ 3,286,589.41
	$200,000,000 FUND.		
Fiscal year ending June 30,	1919	$2,185,550.65	
	1920	3,278,325.97	
	1921	3,273,800.93	
Sub-total			8,737,677.55
	$75,000,000 FUND.		
Fiscal year ending June 30,	1922	$3,246,281.07	
Sub-total			3,246,281.07
Total to 1922			$15,270,548.03
	$190,000,000 FUND.		
1923	$50,000,000		
1924	65,000,000		
1925	75,000,000		
Fiscal year ending June 30,	1923	$2,164,187.38	
	1924	2,797,888.59	
	1925 (estimated)	3,246,281.07	
Sub-total			8,208,357.04
Total Federal aid allotments to Illinois			$23,478,905.07

The status of Federal aid funds, January 1, 1924, is shown in Table V.

An examination of this table shows that there are four distinct steps in Federal aid procedure, namely: Project Statement; Project Agreement Estimate; Project Agreement; Completed Work.

Funds are first obligated by submission to and approval by the Federal Government of the Project Agreement, which states the nature of the proposed improvement, its estimated cost, and the share of the cost to be paid by the Federal Government and State respectively. After a section is placed under contract, a Project Agreement Estimate, based on actual quantities and contract prices, is submitted to the Federal Government and, upon approval, the funds covering the above estimate are transferred to the Project Agreement Estimate stage. The Project Agreement, which is the contract between the Federal and State officials regarding the manner in which the improvement is to be made and the percentage of cost to be shared by the Federal and State Governments respectively, is then executed and the funds are then transferred to this stage. After the work is completed, reimbursements are received from the Federal Government for its share of the cost of such completed work.

The last column, therefore, shows the total amount of Federal aid funds which has been received, and the sum of the amounts requested in the Project Statement, Project Agreement Estimate, and Project Agreement stages is the approximate total amount which is yet to be paid by the Government on outstanding projects.

TABLE V—STATUS OF FEDERAL AID FUNDS.

January 1, 1924.

Project No.	S. I. B. Route No.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Actual cost.	Amount requested.	Amount received.
1	6	83.432							$2,527,303.38	$1,215,679.55	$1,215,679.55
2	1	66.068					$ 9,903.34	$ 2,487.70	2,031,088.46	1,010,842.10	1,010,842.10
3		23.164							697,591.50	346,574.53	346,574.53
4		20.032							726,583.94	358,471.90	358,471.90
5	29	22.900							865,698.56	391,011.33	391,011.33
6	24	60.683	$ 25,500.00	$ 12,750.00			21,504.00	10,752.00	2,268,566.85	1,126,149.14	1,126,149.14
7	7 & 29	63.441	259,970.00	129,985.00	$ 24,722.89	$ 4,785.39	198,798.52	99,399.26	2,190,361.03	1,087,046.23	1,087,046.23
8	4	86.062							3,101,959.28	1,505,416.22	1,505,416.22
9	11	148,383	68,180.00	34,090.00	82,784.06	29,602.75	32,628.71	14,424.20	5,459,757.58	2,611,602.59	2,611,602.59
10	7	21.072							835,585.42	397,085.62	397,085.62
11	1	4.872							118,300.39	59,150.19	59,150.19
12	1	28.863							1,260,278.75	571,579.66	571,579.66
13			Project withdrawn								
14	2	56.664					91,452.34	45,726.16	2,042,660.13	687,970.83	687,970.83
15	13	9.575							178,931.89	49,658.18	49,658.18
16	15	15.076							422,878.45	113,766.67	113,766.67
17	31	14.392							196,862.27	53,344.57	53,344.57
18	10	8.439							205,776.20	54,714.52	54,714.52
19	5	2.634							70,710.01	26,518.75	26,518.75
20	7	17.744							270,547.27	74,568.71	74,568.71
21	8	0.935							43,973.60	12,273.00	12,273.00
22	17	0.180							6,633.52	1,151.71	1,151.71
23	25	12.579					21,257.23	10,628.61	515,577.61	160,473.39	160,473.39
24	21	15.154	40,000.00	20,000.00	191,259.25	95,629.62	25,673.09	12,836.54	179,535.39	89,767.69	89,767.69
25	4	11.385	155,831.27	77,915.63			10,593.04	5,296.52	125,279.01	62,639.50	
26	4	47.561	45,000.00	22,500.00	2,669.36	1,334.68	355,188.81	177,540.40	991,626.71	495,813.33	495,813.33
27	8	8.418			2,278.69	1,139.35	8,433.77	4,216.88	205,328.59	102,664.29	102,664.29
28	8	5.003					9,170.63	4,585.31	150,038.34	75,019.17	75,019.17
29	25	15.624	48,380.41	24,190.20			82,420.37	41,210.19	286,080.04	143,040.01	143,040.01
30	44	13.321					139,160.46	69,580.23	237,557.03	118,778.51	118,778.51
31	31	6.544	120,903.57	60,451.78	79,040.13	39,520.06					
32	15	12,730					136,979.06	68,489.53	179,911.77	89,955.88	89,955.88
33	9	8.163					135,504.40	58,299.39	168,954.30	84,477.14	84,477.14
34	12	8.675			79,277.58	39,592.80	5,852.24	2,926.12	207,565.75	103,782.87	103,782.87
35	12	7.590			19,833.29	9,916.64			170,466.30	85,233.15	85,233.15
36	2	10.245					17,979.55	8,989.78	238,057.49	119,028.74	119,028.74
37	12	0.580					20,314.40	10,157.20	64,136.82	32,068.41	32,068.41
38	3	12.263	15,904.01	220.00			52,826.16	23,705.25	354,422.23	177,211.11	177,211.11
39	27	7.732					107,027.37	53,513.69	155,250.48	77,625.23	77,625.23

40	9	12.105	--------	--------	195,979.72	97,980.86	5,736.61	2,868.30	127,206.14	63,603.07	63,603.07
41	5	5.033	--------	--------	--------	--------	3,566.59	1,783.30	133,696.57	66,848.28	65,072.38
42	1	6.316	--------	--------	--------	--------	36,344.91	18,172.46	187,038.13	93,519.06	93,519.06
43			Project withdrawn								
44	24	6.628	--------	--------	--------	--------	96,705.73	48,352.87	86,257.95	43,128.97	43,128.97
45	36	6.044	--------	--------	--------	--------	178,034.51	89,017.25	4,517.14	2,258.57	2,258.57
46	3	13.916	129,000.00	64,500.00	--------	--------	13,440.27	6,720.14	230,028.85	115,014.42	115,014.42
47	3	10.130	--------	--------	--------	--------	163,530.34	81,765.18	99,195.53	49,597.76	49,597.76
48	8	13.531	--------	--------	--------	--------	190,621.68	95,310.82	211,576.61	105,785.80	105,785.80
49	17	28.583	254,819.87	127,409.93	--------	--------	141,338.09	70,669.04	311,276.68	155,638.33	155,638.33
50	25	14.009	--------	--------	--------	--------	23,040.02	11,520.00	319,921.02	159,960.51	159,960.51
51	9	4.649	--------	--------	--------	--------	4,247.48	2,123.74	109,657.42	54,828.71	54,828.71
52	1	4.069	--------	--------	--------	--------	33,710.94	16,855.47	67,793.86	33,896.93	33,896.93
53	1	4.926	--------	--------	--------	--------	101,808.87	50,312.29	60,172.04	29,735.21	29,735.21
54	2	5.931	--------	--------	135,323.25	67,661.62	--------	--------	--------	--------	--------
55	7	8.460	49,260.00	24,630.00	154,316.63	66,848.50	127,000.57	59,363.88	--------	--------	--------
56	9	20.213	--------	--------	--------	--------	342,156.33	171,078.16	194,732.05	97,366.03	97,366.03
57	13	6.056	--------	--------	--------	--------	98,319.52	49,159.76	80,674.82	40,337.41	40,337.41
58	16	5.116	--------	--------	--------	--------	29,680.02	14,840.01	118,565.76	59,282.88	59,282.88
59	18 & 22	19.119	--------	--------	--------	--------	307,820.24	153,910.11	203,008.46	101,504.23	101,504.23
60	20	4.267	--------	--------	--------	--------	101,353.89	50,676.94	21,923.04	10,961.52	10,961.52
61	25	23.472	--------	--------	--------	--------	152,778.29	76,389.14	439,774.00	219,886.99	219,886.99
62			Project withdrawn								
63	28	9.336	--------	--------	--------	--------	235,205.50	117,602.74	--------	--------	--------
64	30	3.700	--------	--------	--------	--------	13,693.74	6,846.87	99,488.96	49,744.48	49,744.48
65	31	5.449	--------	--------	--------	--------	60,732.39	30,366.20	91,363.79	45,681.89	45,681.89
66	32	7.952	--------	--------	--------	--------	57,437.99	28,718.99	148,852.70	74,426.35	74,426.35
67	42	3.525	--------	--------	104,559.11	52,279.55	--------	--------	--------	--------	--------
68	44	3.057	--------	--------	--------	--------	122,877.40	60,012.51	--------	--------	--------
69	17	0.132	--------	--------	--------	--------	175,061.81	87,520.90	--------	--------	--------
70	12	6.603	--------	--------	--------	--------	82,842.20	42,671.12	125,001.70	61,250.83	61,250.83
71	14	6.492	33,349.78	14,068.89	--------	--------	91,236.34	45,618.17	75,385.88	37,692.94	37,692.94
72	43	10.114	--------	--------	147,932.38	72,915.00	140,105.86	70,052.93	--------	--------	--------
73	25	7.320	--------	--------	--------	--------	170,164.12	85,082.06	--------	--------	--------
74	26	5.622	--------	--------	--------	--------	17,903.44	8,951.72	146,643.16	73,321.58	73,321.58
75	19 & 23	18.089	--------	--------	509,321.73	254,660.86	--------	--------	--------	--------	--------
76	3	13.020	--------	--------	365,619.60	182,809.79	--------	--------	--------	--------	--------
77	2	18.071	--------	--------	492,458.77	246,229.38	--------	--------	--------	--------	--------
78	8	7.296	27,117.18	13,558.59	163,886.61	81,943.30	--------	--------	--------	--------	--------
79	31	5.438	168,944 50	84,472.25	--------	--------	--------	--------	--------	--------	--------
80	12	6.995	--------	--------	177,713.77	88,856.88	--------	--------	--------	--------	--------
	Totals..	1,318.962	$1,442,160.59	$710,742.27	$2,928,976.82	$1,433,716.12	$4,801,163.18	$2,379,098.03	$33.445.588.61	$15,617,427.17	$15,553,011.77

STATE AID.

While there has been no State aid allotment to the various counties for State aid construction since 1917, there has been a considerable amount of activity in each county as far as the State aid system of roads is concerned.

An act of Legislature approved June 24, 1921, known as an "Act in Relation to State Highways," provides that any part or portion of the State aid system not taken over by the Department of Public Works and Buildings shall remain under the jurisdiction and control of the various county boards. The act also provides an annual tax, known as the "County Highway Tax," for the purpose of maintaining the State aid road system in each county.

Since the passage of the act practically every county in the State has revised its State aid system so that the most important roads will fall on the State aid system.

Under the provisions of the State Aid Road Act, all changes in the State aid system of any county must be approved by the Department of Public Works and Buildings. It is first necessary for the county board to pass a resolution describing the changes desired, which resolution is sent to the Division of Highways. It is investigated in the field by the District Engineer and a report submitted. If satisfactory, the changes requested are approved. The work of keeping a record of State aid mileage in each county is handled by the Bureau of Design.

An act of Legislature, approved June 21, 1923, increased the percentage of the total road mileage in each county which could be designated as State aid roads. The permissible percentages at the present time, are for first class counties, twenty per cent, second class counties, twenty-five per cent and third class counties thirty per cent.

Immediately following the approval of this act of the Legislature, the various counties began designating additional mileage so as to take advantage of the increased percentage which resulted in quite large additions to the existing system.

The status of the State aid mileage in each county in the State on January 1, 1924, is shown in Table VI.

TABLE VI—STATUS OF STATE AID ROAD MILEAGE.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Adams	2	1,538.00	384.50	305.15	79.35
Alexander	1	427.00	85.40	65.45	19.95
Bond	1	655.00	131.00	98.79	32.21
Boone	1	492.00	98.40	73.80	24.60
Brown	1	513.00	102.60	74.45	28.15
Bureau	2	1,481.00	370.25	299.10	71.15
Calhoun	1	317.80	63.56	51.10	12.46
Carroll	1	748.00	149.60	116.30	33.30
Cass	1	570.00	114.00	81.37	32.63
Champaign	2	1,910.00	477.50	379.83	97.67
Christian	2	1,269.00	317.25	239.50	77.75
Clark	1	994.00	198.80	150.20	48.60
Clay	1	842.00	168.40	128.10	40.30
Clinton	1	704.00	140.80	100.90	39.90
Coles	2	968.00	242.00	180.60	61.40
Cook	3	1,503.50	451.05	447.72	3.33
Crawford	1	821.00	164.20	127.40	36.80
Cumberland	1	687.00	137.40	94.30	43.10
DeKalb	2	1,089.00	272.25	231.75	40.50
DeWitt	1	732.00	146.40	107.75	38.65
Douglas	1	790.00	158.00	99.90	58.10
DuPage	2	776.00	194.00	155.25	38.75
Edgar	2	1,105.00	276.25	256.58	19.67
Edwards	1	414.00	82.80	62.80	20.00
Effingham	1	956.00	191.20	140.40	50.80
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	132.60	37.00
Franklin	1	648.00	129.60	119.45	10.15
Fulton	2	1,488.00	372.00	306.90	65.10
Gallatin	1	440.00	88.00	64.50	23.50
Greene	1	805.00	161.00	151.40	9.60
Grundy	1	756.75	151.35	132.15	19.20
Hamilton	1	817.00	163.40	124.60	38.80
Hancock	2	1,452.00	363.00	260.25	102.75
Hardin	1	245.00	49.00	37.50	11.50
Henderson	1	595.00	119.00	97.15	21.85
Henry	2	1,401.00	350.25	267.65	82.60
Iroquois	2	2,108.00	527.00	424.85	102.15
Jackson	2	977.00	244.25	192.55	51.70
Jasper	1	960.00	192.00	142.25	49.75
Jefferson	2	1,100.00	275.00	178.10	96.90
Jersey	1	572.00	114.40	91.60	22.80
JoDaviess	2	883.00	220.75	197.65	23.10
Johnson	1	432.00	86.40	83.30	3.10
Kane	2	836.00	209.00	166.90	42.10
Kankakee	2	1,300.00	325.00	231.22	93.78
Kendall	1	508.00	101.60	79.50	22.10
Knox	2	1,308.85	327.21	259.92	67.29
Lake	2	776.00	194.00	180.29	13.71
LaSalle	2	2,006.00	501.50	380.83	120.67
Lawrence	1	662.00	132.40	112.65	19.75
Lee	2	1,229.00	307.25	303.15	4.10
Livingston	2	2,029.00	507.25	376.00	131.25
Logan	2	957.00	239.25	191.60	47.65
McDonough	2	1,094.00	273.50	222.10	51.40
McHenry	2	993.00	248.25	236.15	12.10
McLean	2	2,080.00	520.00	457.40	62.60
Macon	2	1,027.00	256.75	205.85	50.90
Macoupin	2	1,427.00	356.75	282.07	74.68
Madison	2	1,169.00	292.25	229.90	62.35
Marion	2	1,138.00	284.50	224.35	60.15
Marshall	1	618.00	123.60	109.52	14.08
Mason	1	798.00	159.60	115.30	44.30
Massac	1	368.00	73.60	54.05	19.55
Menard	1	506.00	101.20	80.60	20.60
Mercer	1	911.00	182.20	141.30	40.90
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1,258.00	314.50	251.40	63.10
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	97.20	26.40
Ogle	2	1,314.00	328.50	326.40	2.10
Peoria	2	1,099.75	274.93	236.65	38.28
Perry	1	706.00	141.20	111.75	29.45
Piatt	1	764.00	152.80	132.25	20.55
Pike	2	1,542.00	385.50	285.75	99.75

TABLE VI—Concluded.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Pope	1	559.30	111.86	89.10	22.76
Pulaski	1	334.50	66.90	43.85	23.05
Putnam	1	270.00	54.00	45.55	8.45
Randolph	2	886.00	221.50	173.50	48.00
Richland	1	809.00	161.80	120.90	40.90
Rock Island	2	688.00	172.00	142.40	29.60
St. Clair	2	1,279.00	319.75	283.55	36.20
Saline	1	609.00	121.80	89.80	32.00
Sangamon	2	1,401.00	350.25	237.95	112.30
Schuyler	1	735.00	147.00	114.35	32.65
Scott	1	363.00	72.60	52.30	20.30
Shelby	2	1,495.00	373.75	290.35	83.40
Stark	1	531.00	106.20	112.05	----------------
Stephenson	2	1,077.00	269.25	208.80	60.45
Tazewell	2	1,010.00	252.50	213.50	39.00
Union	1	626.00	125.20	115.20	10.00
Vermilion	2	1,558.00	389.50	324.05	65.45
Wabash	1	380.00	76.00	57.90	18.10
Warren	1	990.00	198.00	168.20	29.80
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	211.05	65.15
White	2	992.00	248.00	203.23	44.77
Whiteside	2	1,130.00	282.50	227.65	54.85
Will	2	1,611.00	402.75	334.35	68.40
Williamson	2	827.00	206.75	160.70	46.05
Winnebago	2	885.00	221.25	188.60	32.65
Woodford	1	941.00	188.20	140.40	47.80
Total	--------	96,840.45	22,576.51	18,164.37	4,417.99

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

County.	Number of counties.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designed.
1	52	34,175.35	6,835.07	5,377.08	1,463.84
2	49	61,161.60	15,290.39	12,339.57	2,950.82
3	1	1,503.50	451.05	447.72	3.33
Total	102	96,840.45	22,576.51	18,164.37	4,417.99

GRADE SEPARATIONS.

A very important item of the work carried on by the Bureau of Design is the handling of grade separation cases. Under the statutes of Illinois, all matters relating to the separation of grades between highways and railroads must be taken before the Illinois Commerce Commission. It is necessary to file a petition with this body in all cases relating to grade separations or new grade crossings and one or more hearings must be held, at which all parties interested have an opportunity to present evidence concerning the case. After hearings have been held, the Commerce Commission issues an order, provided the grade separation has been shown to be necessary, requiring that the work be completed and setting forth the division of costs.

This work has reached such large proportions that it is necessary to keep a special force of men continuously employed preparing petitions, carrying on negotiatings with the railroad companies and attending hearings.

There are approximately 16,000 grade crossings in the State of Illinois of which 7,000 are within the corporate limits of cities and villages and 9,000 outside. Of the 9,000 country highway crossings, 4,700 are considered as extra hazardous.

On the $60,000,000 State bond issue system there will be approximately 400 grade crossings on the completed system. In addition to the 400 mentioned, approximately 325 others will have been avoided or eliminated. It is estimated that approximately 185 will have been avoided or eliminated by relocations, and that 140 others will have been eliminated by means of a separation of grades.

It is estimated that 90 per cent of the traffic in the State will use the State bond issue system when completed. This being true, we may draw the conclusion that if the number of grade crossings on the completed State bond issue system is as many as 400, then 90 per cent of the traffic of the State will use 4½ per cent of the total number of grade crossings in the State outside the corporate limits of cities and villages. This illustrates the importance of eliminating grade crossings wherever possible.

If impossible to avoid grade crossings on the State wide system, such crossings are or will be protected by warning signs, warning bells, crossing gates or watchmen.

Twenty-four active grade separation cases, for which petitions have been filed with the Illinois Commerce Commission are now under way. In addition to these, there are a large number of other cases for which negotiations are under way with the various railroads interested, but which have not yet reached the stage where a petition has been filed.

Wherever possible, an attempt is made to agree with the railroad company concerning the details of the structure to be erected and the division of the cost before the case is taken to the Commerce Commission.

REFUND TO COUNTIES.

Section 10 of the State-Wide Act, approved June 22, 1917, provides that the Department of Public Works and Buildings shall utilize all State aid paved roads previously constructed by the counties on the State wide system of roads, provided such roads are of proper durable hard-surfaced type to make it practicable to do so. If such roads are utilized, then the Department of Public Works and Buildings must set apart and allot to each county an amount of money equivalent to the share of the cost of such roads paid by such county.

This money must be used, at the option of the county, either in the payment of any county bonds issued and used to improve its State aid roads, or, in the improvement of any one or more of its improved or unimproved State aid roads by constructing thereon a durable hard-surfaced road under the direction and to the satisfaction of the Department of Public Works and Buildings.

The 52d General Assembly, under House Bill 766, appropriated the sum of $3,889,382.23, and under House Bill 867, $2,869,289.87 for the purpose of making such refunds. The task of preparing the information upon which these appropriation bills were based was assigned to the Bureau of Design. It was necessary to go through all of the de-

TABLE VII—GRADE SEPARATION CASES SETTLED.

(January 1, 1919, to January 1, 1924.)

Location.				Railroad.	I. C. C. case number.	Type of crossing.	Petition filed.	Final hearing.	I. C. C. order issued.	Work com-pleted.
Rt.	Sec.	County.	Near.							
1	11	Will	Steger	C. & E. I	9264	Under	July 9, 1919	May 10, 1922	May 25, 1922	Aug. 1923
1	F-1	Clark	Marshall	Pennsylvania	10702	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Apr. 1923
1	F	Clark	Marshall	C., C., C. & St. L	11076	Under	Oct. 28, 1920	Nov. 3, 1921	Dec. 6, 1921	Feb. 1923
1	161	Cook	Homewood	I. C	13375	Under	June 25, 1923	July 19, 1923	Oct. 17, 1923	**
2	14	Pulaski	Ullin	C. & E. I	12634	Under	Sept. 5, 1922	May 1. 1923	June 21, 1923	Nov. 1923
2	3	Jackson	DeSoto	M. P	12636	Under	Sept. 5, 1922	Feb. 6, 1923	Apr. 18, 1923	Dec. 1923
3	67	Monroe	Columbia	M. & O	12637	Under	Sept. 5, 1922	Mar. 22, 1923	May 8, 1923	Dec. 1923
3	*	St. Clair	East St. Louis	B. & O., E. & A. L	10291	Under	Mar. 1, 1920	June 29, 1921	Mar. 28, 1922	
5	7	Cook	Spaulding	E., J. & E	12635	Over	Sept. 5, 1922	Oct. 25, 1922	Dec. 6, 1922	
7	9	Bureau	Langley	C. & N. W	11705	Under	June 6, 1921	July 27, 1921	July 28, 1921	Feb. 1923
10	24	Morgan	Arnold	Wabash	11857	Under	Aug. 27, 1921	Nov. 23, 1922	Dec. 15, 1922	
10	21	Sangamon	Curran	C. & N. W	12460	Under	June 6, 1922	Oct. 18, 1922	Dec. 6, 1922	Dec. 1923
10	19X	Sangamon	Riverton	I. T., Inc	13511	Under	Sept. 8, 1923	Oct. 4, 1923	Oct. 24, 1923	
11	39	Madison	St. Jacob	Pennsylvania	10705	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Dec. 1923
11	Y	Fayette	Mulberry Grove	Pennsylvania	10704	Over	June 15, 1920	Nov. 3, 1921	Nov. 9, 1921	June 1922
11	L	Effingham	Effingham	Pennsylvania	10703	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Apr. 1923
14	9	Hamilton	McLeansboro	L. & N	12895	Under	Dec. 28, 1922	Oct. 23, 1923	Nov. 7, 1923	
19	86	Cook	DesPlaines	C. & N. W., Soo	12421	Under	July 11, 1922	Nov. 28, 1922	Apr. 25, 1923	
22	42A	Cook*	Matteson	I. C	12060	Under	Dec. 6, 1921	Jan. 24, 1922	Jan. 25, 1922	
26	1	Stephenson	South Freeport	C. G. W	13590	Under	Oct. 8, 1923	Oct. 18, 1923	Nov. 21, 1923	Nov. 1923
29	M-2	Peoria	Chillicothe	A., T. & S. F	9477	Under	Sept. 10, 1919	None	Apr. 28, 1920	Oct. 1921
31	3	Adams	Paloma	C., B. & Q	12459	Under	June 6, 1922	Mar. 6, 1923	Apr. 11, 1923	
37	13	Williamson	Johnston City	I. C	12639	Over	Sept. 6, 1922	Oct. 4, 1923	Dec. 11, 1923	

* State represented by counties in proceedings.

** Work not completed where no date is shown.

partment records and determine as accurately as possible all of the State aid roads of proper type which had been, or would be utilized as a part of the State wide system. It was then necessary to prepare refund certificates showing the exact amount which was due the county and to formally accept and make such roads a part of the State wide system.

All such certificates have been prepared by the Bureau of Design, with the assistance of the District Engineers, Bureau of Construction and Bureau of Audits. A record of the status of funds due the various counties is kept by this bureau.

The 63d General Assembly, under the provisions of House Bill 822 re-appropriated such portion of the refund money as remained unexpended from the previous appropriations, and, in addition, provided for new county roads which had been taken into the system. The amount of this appropriation bill was $4,025,632.56. The information upon which this appropriation bill was based was prepared by the Bureau of Design in the same manner as that for the two previous bills.

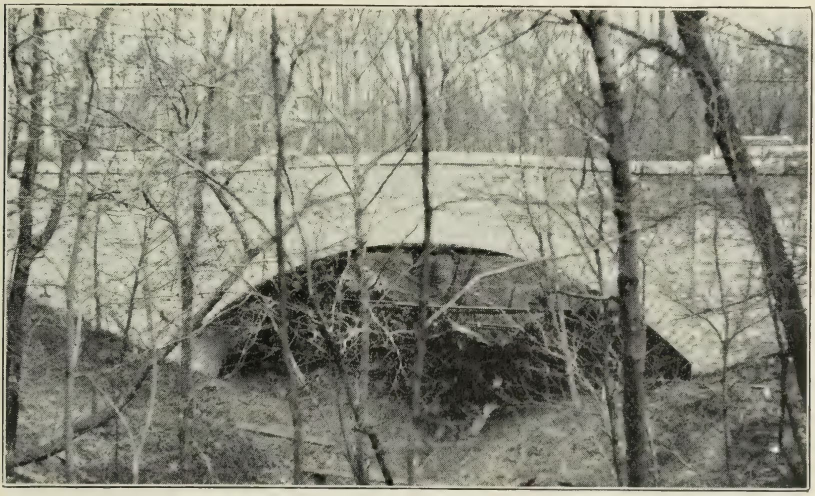


Figure 8.—Hawthorne Bridge on Sheridan Road, Cook County. One span of 50 feet, roadway 30 feet, with sidewalks. Reinforced concrete deck girder construction masked by stone arches.

BRIDGES.

During the year 1923 the bridge work of the Bureau of Design was of greater volume than ever before. This was in line with the extensive construction program on the State highway system and the increased activities of the County Superintendents of Highways in improving county and township roads. In addition to handling an immense volume of work in the preparation of plans and specifications for bridges and culverts of various types, some additions were made to the collection of standard bridge plans. These include reinforced concrete abutments for through and deck girder concrete bridges, also new sandards for steel superstructures drawn up in detail to simplify the checking of shop drawings.

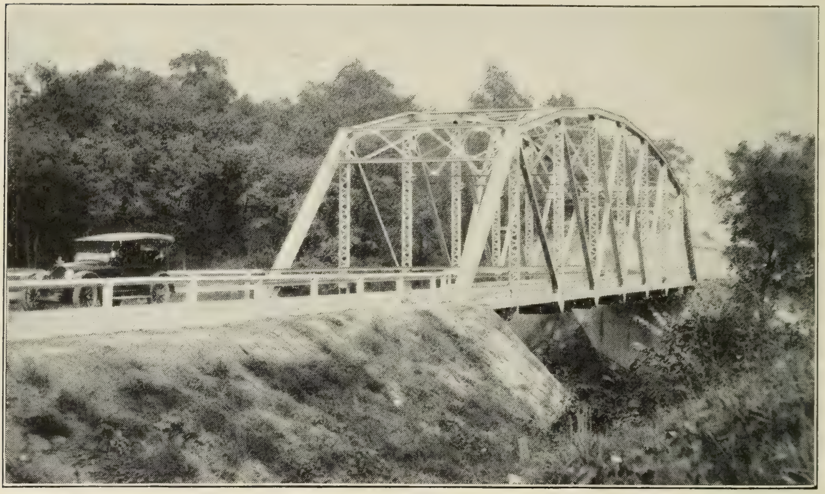


Figure 9.—A 160 foot steel span in McLean County, over the Mackinaw River. The curved chord has a pleasing appearance and also reduces the cost.

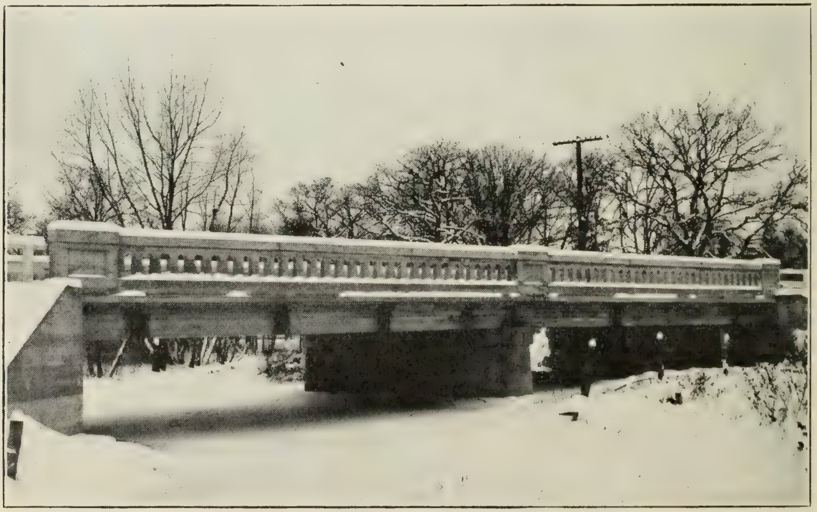


Figure 10.—A harmonious deck girder structure at Half-Day, on Route 21. Two spans of 40 feet each.

The following table summarizes briefly the work handled by the Bridge office from 1906 to 1923, inclusive.

TABLE VIII—SUMMARY OF BRIDGE WORK TO DECEMBER 31, 1923.

Year.	Plans and specifications prepared.	Estimated cost.	Contracts let on State plans.	Contract price.	Foreign plans approved.
1906	15		11	$ 37,035.00	Plans prepared by County Superintendent of Highways and others outside of Division of Highways.
1907	113		48	41,519.00	
1908	149		64	165,674.00	
1909	122		92	133,285.00	
1910	203		141	148,432.00	
1911	241		127	238,903.00	
1912	214		150	212,694.00	
1913	238	$ 342,052.00	139	200,834.00	5
1914	269	470,363.00	109	184,792.00	269
1915	707	984,420.00	565	541,509.00	230
1916	735	1,169,743.00	439	566,657.00	653
1917	480	812,614.00	502	582,993.00	503
1918	206	499,702.00	169	277,130.00	443
1919	231	761,458.68	202	514,897.00	725
1920	443	2,841,896.22	301	2,208,494.84	261
1921	384	2,134,476.49	337	1,909,455.67	362
1922	374	2,365,726.45	317	1,775,066.00	839
1923	484	3,359,109.03	413	3,170,269.46	1,451
Total	5,608	$15,741,560.87	4,126	$12,909,639.97	5,741

The above table does not include bridges and culverts built in connection with the State aid, Federal aid and State bond issue road work, as such structures are included in the reports on road construction. During the year 1923, plans were prepared for 6,984 bridges and culverts, to be constructed in connection with State road contracts at an estimated cost of $3,201,215.87. Adding this to the bridge work given in the table above for the year 1923 the total output of the bridge office during this year was 7,468 plans for bridges and culverts, estimated to cost $6,560,324.90. This shows an increase of 31 per cent over the output of 1922. Without making any deduction for other activities, the average cost of preparing plans and specifications in 1923 was 1.27 per cent of the estimated cost of the bridge work for which plans were prepared.

In Table No. IX the work done during 1923 is classified according to funds used.

TABLE IX—CLASSIFICATION OF 1923 BRIDGE WORK.

Classification.	Plans prepared.		Contracts awarded.		
	Number.	Estimated cost.	Number.	Estimated cost.	Contract price.
County bridges	273	$ 720,177.00	178	$ 413,036.00	$ 365,592.40
State bridges	211	2,638,932.03	235	2,932,935.69	2,804,677.06
In State road contracts	6,984	3,201,215.87		With pavement	
Total	7,468	$6,560,324.90	413	$3,345,971.69	$3,170,269.46

Other work performed during the year 1923—

Plans checked and approved for County Superintendents of Highways	1,451
Existing bridges analyzed for strength	17
Shop drawings for steel bridges checked	30
Shop inspection for steel bridges	37

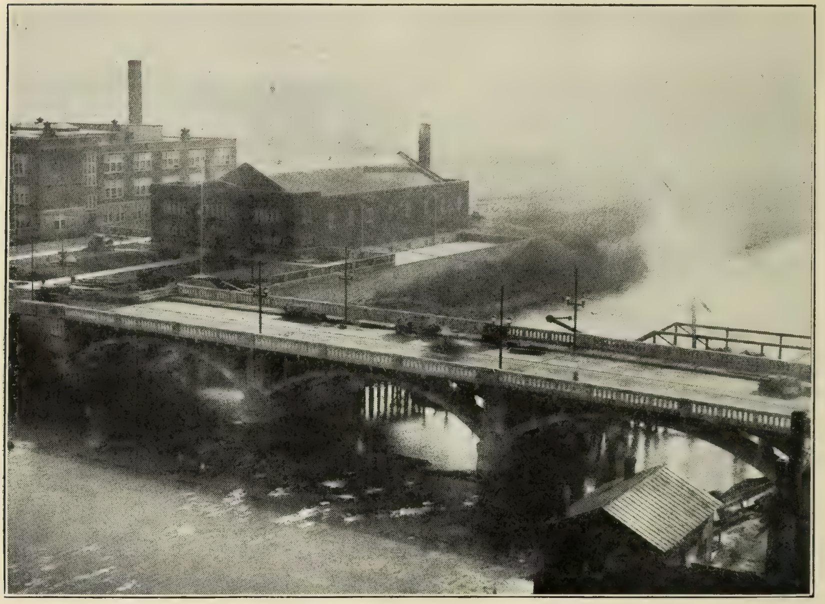


Figure 11. A reinforced concrete open spandrel arch on East Main Street in the City of Ottawa. Three spans of 73 feet each.

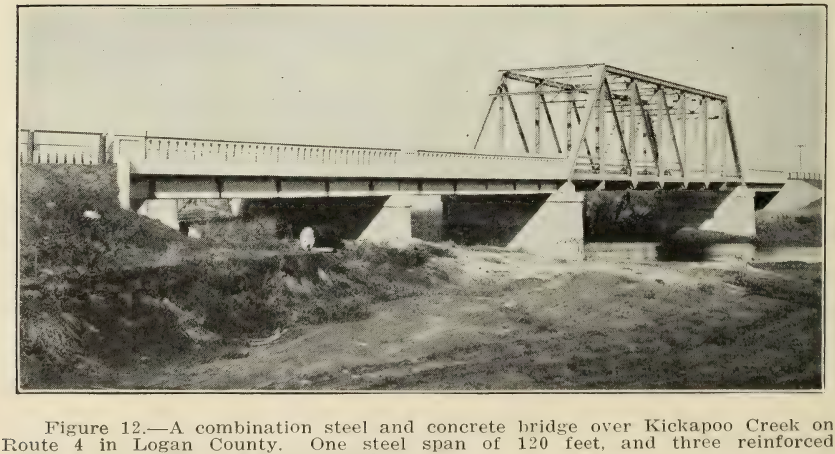


Figure 12.—A combination steel and concrete bridge over Kickapoo Creek on Route 4 in Logan County. One steel span of 120 feet, and three reinforced concrete deck girders of 50 feet each.

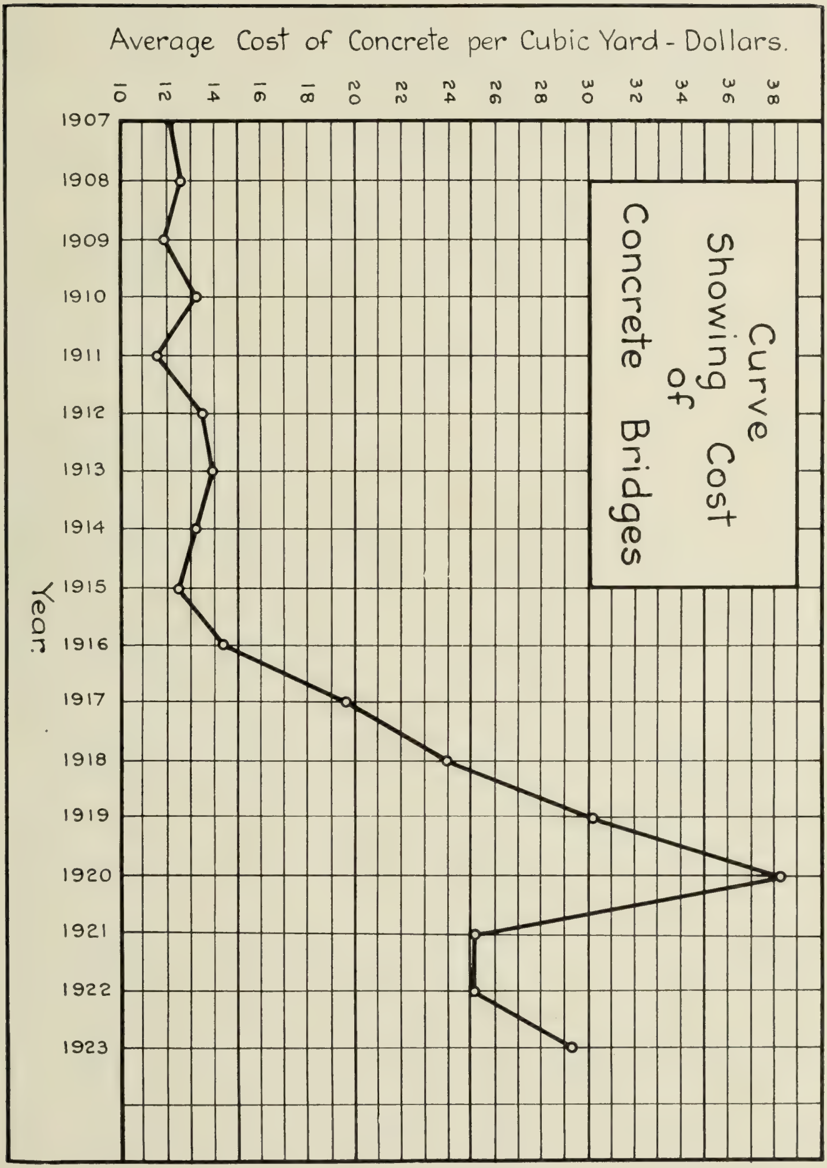


Figure 13.—This curve shows the average cost of concrete bridge work from 1907 to 1923. The cost is given per cubic yard of concrete, which includes reinforcing steel, cement and all other items of construction cost. The peak price was reached in 1920, with considerably lower prices in 1921 and 1922, and a somewhat higher price in 1923. The higher price in 1923 was caused by an advance in prices for labor and materials. The mill price for steel advanced about 33 per cent, cement about 7 per cent and labor and teams about 10 per cent. Prices for sand, stone and form lumber remained practically constant.

BUREAU OF CONSTRUCTION.

During 1923 there was constructed under State supervision 1,085 miles of road, of which 858 miles was on the State bond issue system, the balance being constructed as State aid or county 15d work. This mileage is made up as follows: Portland cement concrete, 1,013½ miles; brick, 14¾ miles; gravel, 56¾ miles. In addition, there was moved approximately 3,079,145 cubic yards of earth work in separate grading contracts and there was constructed approximately 56,794 cubic yards of reinforced concrete in independent bridge contracts.

Weather conditions throughout the season were generally unfavorable to construction records or rapid progress. To offset this, however, shipping conditions during the season were ideal. The car shortage which is commonly encountered about September 1st did not develop, and, due to the shortage of large quantities of cement during the early months of the year, there was no cement shortage. In general, labor conditions were normal. All things considered, therefore, 1923 was an average construction season.

The same features which resulted in a large program in 1922 were also largely responsible for the 1923 record; namely, contractors familiar with Illinois construction methods, equipment standardized to meet the requirements of the work, carefully trained organizations, preliminary storage of cement and aggregates, a program so arranged as to utilized the transportation facilities of the State, and awarding of contracts in the year preceding the construction season.

During 1923 a decided effort was made to complete all contracts within the time limits. Careful check was kept by each District Engineer to see that the weekly progress on each section was such as would indicate completion within the time limit. Where the rate of progress on any section was unsatisfactory, the contractor was required to take such steps as were necessary to bring his output up to schedule. The results obtained were gratifying, and examination of the records of all paving sections under contract June 1, 1923 indicates that 93 per cent of such contracts were actually completed insofar as the pavement slab was concerned.

The year 1923 demonstrated the fact that there has been developed and now exists in Illinois a most efficient and reliable corps of contractors. The cooperative attitude of the contractors was a great factor in securing record breaking quantity and excellent quality in the season's construction.

Some outstanding construction features of 1923 are as follows:

Maintaining the standard of smoothness as required by the specifications and demonstrating the ability of contractors to construct pavements with a surface practically free from variations.

The use of the new pavement cross section as evolved from the results of the Bates road experiments, featuring the thickened edge, longitudinal center joint and longitudinal reinforcing rods in the edge of the slab.

The satisfactory use of calcium chloride in curing Portland cement concrete pavements.

Demonstration of the fact that the subgrade machine can be used on both truck jobs and industrial jobs, thus securing a smooth subgrade and consequently proper thickness of pavement.

Demonstration of the fact that with a careful study of operation layout, the industrial railroad can be used on much steeper grades than previously assumed.

Advisability of awarding heavy grading and bridge contracts prior to paving contracts.

CEMENT STORAGE.

In past years, shortage of cement, due to excessive demands or to lack of adequate transportation facilities at the peak of the construction season, has greatly curtailed the building of pavement. In order to eliminate this condition, large quantities of cement were stored during February, March and April of 1923. The total amount of cement contracted for during 1923 was 3,300,000 barrels, and prior to May 1st there had been shipped 37 per cent of this amount.

Standard methods of storage were established, all storage space being approved by the department, whereupon the department became responsible for the cement. During January an intensive campaign to encourage the storage of cement was inaugurated and great credit is due the contractors for the excellent cooperation secured. This storage policy eliminated all delays in construction due to cement shortages.

An analysis of Figure 14 shows the satisfactory shipments during the storage period. The slight drop in May is accounted for by the fact that paving work did not start quite as soon as anticipated, and the general decline in shipments during August, September and October indicates that the contractors held their stored cement until that period when shortage of cement usually occurs.

CRUSHED STONE SHIPMENTS FROM THE STATE PENITENTIARIES.

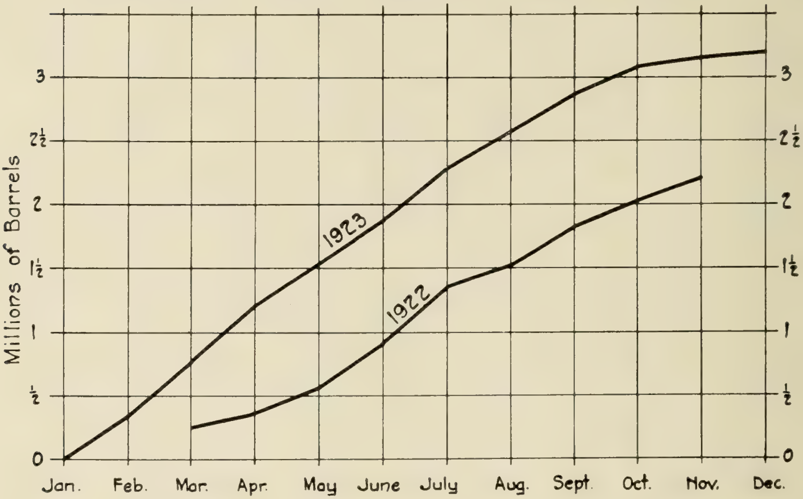
There was shipped during 1923, 51,567 cubic yards of stone from the Joliet Penitentiary, 35,866 cubic yards being to State work, the balance to townships. From Menard there was shipped 8,203 cubic yards of stone to the townships in the several counties adjacent to the penitentiaries.

The same fact characterized shipments of stone from the penitentiaries during 1923 as was apparent during preceding years; namely, that the demands for stone far exceeded the supply, and it is safe to estimate that even if the output of crushed stone from the State penitentiaries were doubled, the supply would still not be in excess of the demand for this product.

CONSTRUCTION BY DAY LABOR.

Four day labor outfits were in operation during 1923. The truck-operated outfit located at Boskydell completed the fifteen-mile stretch of paving on Route 2 between Cobden and Carbondale and, about September 1st was moved to Effingham, where it will be used in the construction of the twenty-mile section of Route 25 between Effingham and Louisville, this particular job being selected due to the unfavorable railroad facilities which will require unusual methods of transportation.

BUREAU OF CONSTRUCTION
CEMENT DATA 1923
COMPARATIVE CURVE
ACCUMULATIVE TOTAL CEMENT SHIPMENTS, 1922-1923.



COMPARATIVE CURVE
MONTHLY CEMENT SHIPMENTS, 1922-1923.

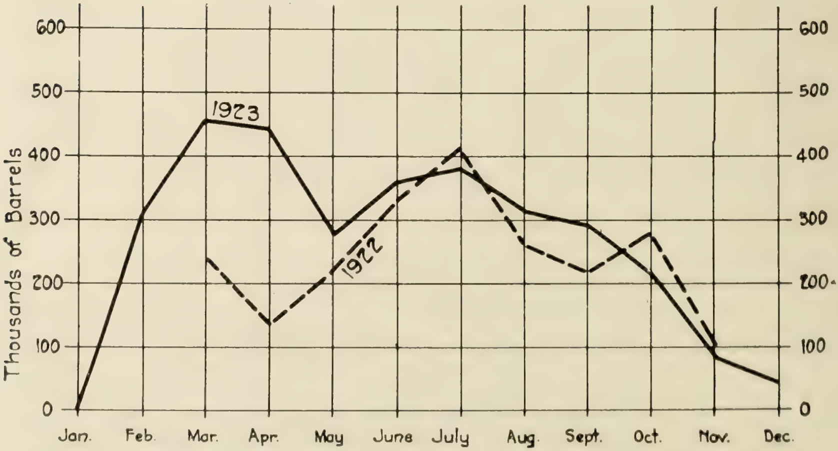


Figure 14.

No pavement was laid on this latter section in 1923, but a considerable amount of grading and culvert work was completed.

The truck outfit located on Route 36 west of the Illinois River completed the road from the river to Pittsfield and was then moved to Kankakee to assit one of the other day labor outfits working on Route 17 to complete its program.

The industrial outfit located on Route 36 between the Illinois River and Winchester worked under rather unfavorable conditions during the first part of the season, due to the fact that all aggregates had to be transported by ferry across the river. Increased equipment, however, placed this outfit on a satisfactory basis and the pavement was completed to within about two miles of Winchester.

The second industrial outfit was located on Route 17 west of Kankakee, and built approximately ten miles of pavement immediately adjacent and west of Kankakee.

TABLE X.—GENERAL SUMMARY OF 1923 CONSTRUCTION.

Paving contractors including those engaged in county work under State supervision	132
Number paving mixers including those engaged in county work under State supervision	199
Paving sections under contract in 1923	332
Gravel and Macadam sections under contract in 1923	23
Number paving mixers operated with Industrial	45
Number paving mixers operated with Trucks	152
Number paving mixers operated with Miscellaneous outfits	2
Number paving mixers operated with Central proportioning plants	173
Number paving mixers operated with Central mixing plants	23
Number paving mixers operated from stock piles	3
Number of bridge contractors	95
Number of grading contractors	60
Total number of paving, grading and bridge contractors having work in 1923	254
Largest day's run in feet made by one mixer	2,017
Largest week's run in feet made by one mixer	7,429
Largest month's run in feet made by one mixer	20,702
Largest year's run in miles made by one mixer	15.37

11,000 men and 3,000 teams were employed directly in the construction of road and bridge work this year.

TABLE XI—SUMMARY OF MILEAGE CONSTRUCTED DURING 1923.

	Pavement—miles.	Grading—miles.	Bridges—number.
Carried over from 1922	**587.30	**109.81	76
Awarded in 1923	*1,079.82	294.07	248
Deductions in 1923	.57	0	0
Additions in 1923		14.07	49
Total for 1923	1,666.55	417.95	373
Constructed in 1923	1,085.02	202.36	180
Carried over to 1924	**581.53	**215.59	193

* This figure includes 23.69 miles of county 15d pavement upon which construction was started, but contracts were not approved.

** The mileage carried over in each case includes considerable mileage awarded late in the year for construction the year following.

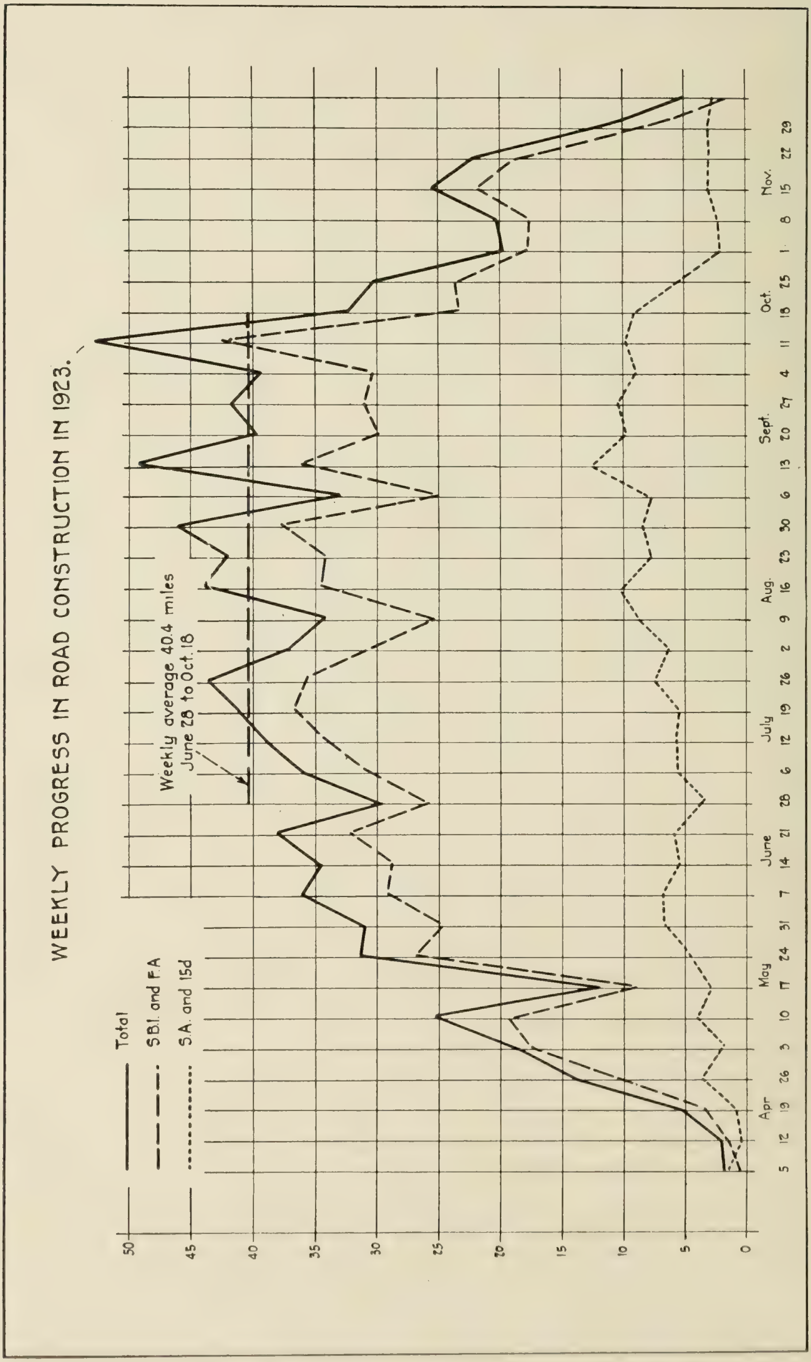

WEEKLY PROGRESS IN ROAD CONSTRUCTION IN 1923.
Total
S.B.I. and F.A
S.A. and 15d
Weekly average 40.4 miles
June 28 to Oct. 18
50
45
40
35
30
25
20
15
10
5
0
Apr
5
12
19
26
May
3
10
17
24
31
June
7
14
21
28
July
6
12
19
26
Aug.
2
9
16
23
30
Sept.
6
13
20
27
Oct.
4
11
18
25
Nov.
1
8
15
22
29

Figure 15.

BUREAU OF CONSTRUCTION
REPORT OF 1923
COST OF ANALYSIS OF 18 FT. CONCRETE PAVEMENT.

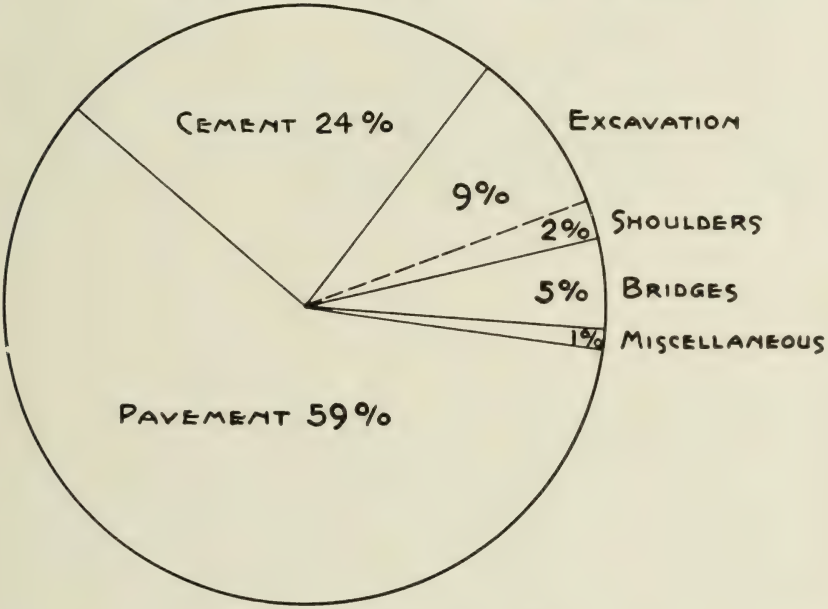


Figure 16.

Miscellaneous includes guard fence, catch basins, section markers, gutters and all extra work not included under other headings.

Note: This information compiled from 114 miles of 18 ft. concrete pavement. Sections taken from all parts of the State and includes all heavy grading and bridge contracts on these sections.

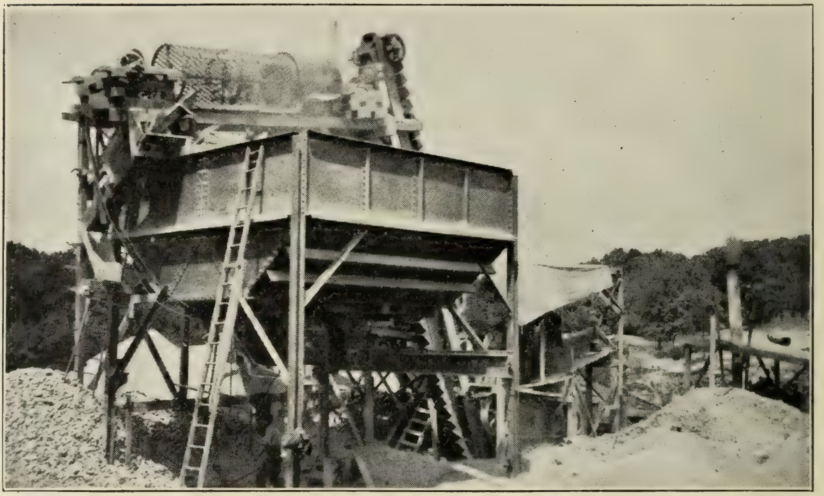


Figure 17.—Steel bins for measuring sand and stone, showing batch meters Route 27 in Carroll County.

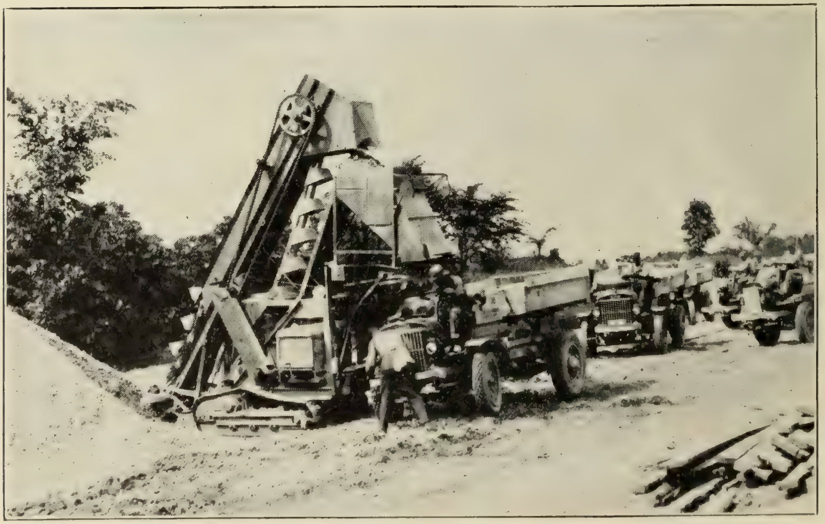


Figure 18.—Loading crushed stone from large stock piles to truck outfit. Route 2 in Jackson County.

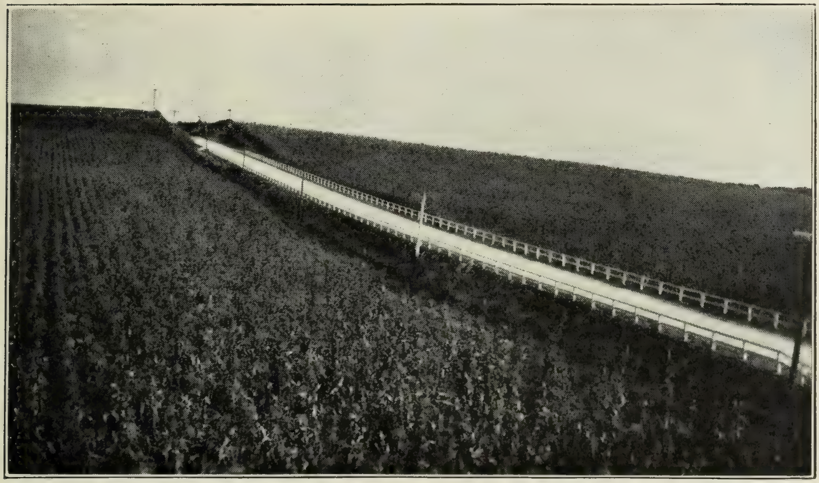


Figure 19.—View of State highway in Bureau County. State Bond Route 28.

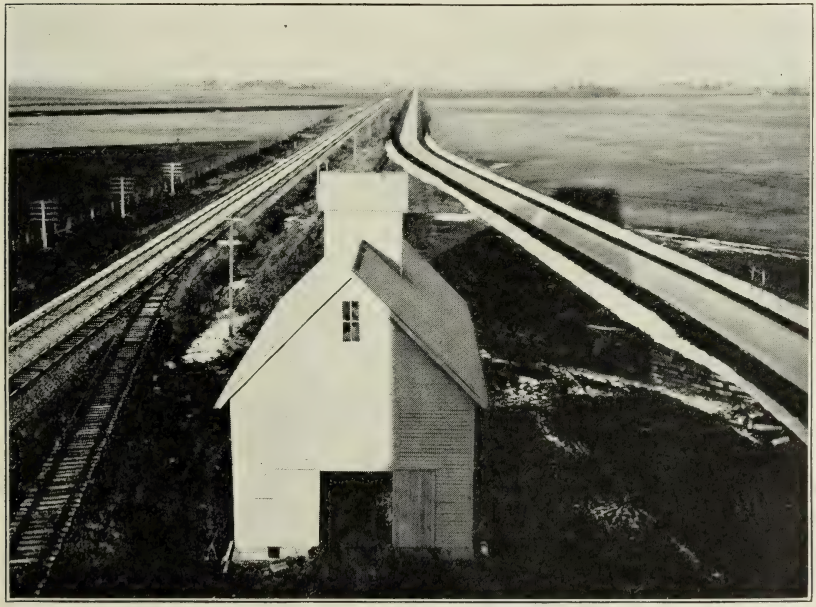


Figure 20.—Two modes of modern transportation. Route 4 in Logan County.

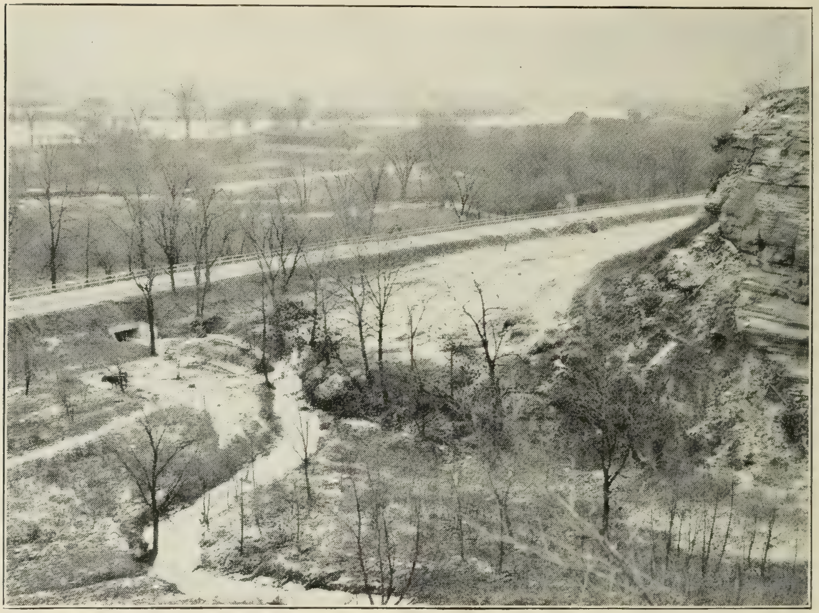


Figure 21.—A view of the Illinois River valley, State road in foreground. Route 7 in La Salle County.

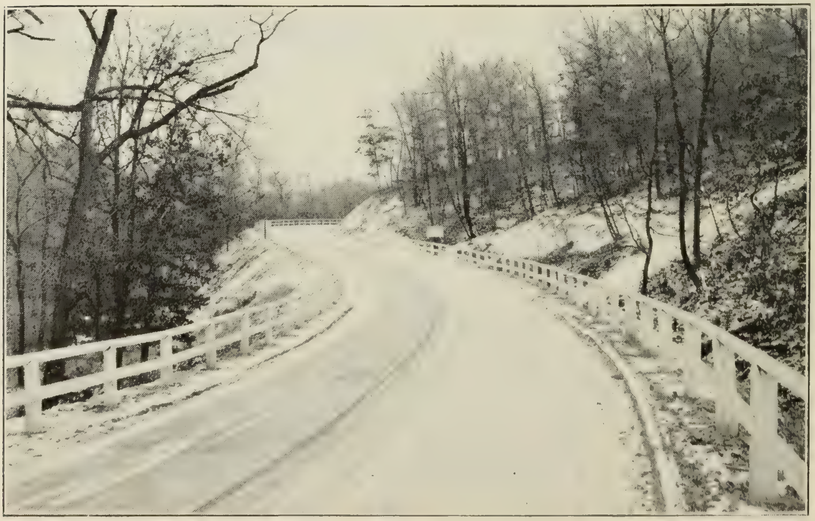


Figure 22.—In Starved Rock Park. Route 7 in La Salle County.

BUREAU OF MAINTENANCE.

The maintenance of the improved roads of the State of Illinois is carried on by the Bureau of Maintenance. This bureau has been organized and developed under the general direction of the Chief Highway Engineer and the personal supervision of the Engineer of Maintenance. Each of the nine districts of the State has its own maintenance organization which handles the maintenance problems of that district.

In each district, the roads that have been completed and accepted for maintenance are divided into patrols of approximately twenty miles in length. Each patrol is placed under the direct supervision of a patrolman, whose duty it is to maintain it in as nearly perfect condition as possible. He is required to keep all cracks in the pavement filled and shoulders well shaped, to cut the weeds, clean out ditches and drains, add additional material to the surface of the road when necessary, perform minor repairs on bridges and culverts, etc. The patrolman makes a daily and weekly report to the District Engineer in order that he may be kept informed in regard to the work. Each patrolman is required to take care of his patrol without assistance as far as practicable, but there are times when it is necessary to secure additional help for special work such as mowing weeds, filling cracks in the pavement, etc.

A number of patrols are grouped together and placed under the direction of a supervising patrolman, whose duty it is to instruct the patrolmen in regard to their work, and to see that such work is done in accordance with the practice and instructions of the Bureau of Maintenance in a neat, efficient, and workmanlike manner.

The following tabulation shows the maintenance costs for the year 1923 figured on a per mile basis:

TABLE XII—MAINTENANCE COST PER MILE DURING 1923.

Type.	*Miles.	Cost per mile.		
		Maintenance of wearing surface.	Upkeep of highway exclusive of wearing surface.	Total.
Brick	136.20	$ 88.86	$192.81	$281.67
P. C. concrete	2,065.89	73.47	164.32	237.79
Bit. concrete	41.06	109.47	183.47	292.94
Bit. macadam	30.42	143.97	197.45	341.42
W. B. macadam	35.32	302.37	28.95	331.32
Gravel	113.12	149.39	73.20	222.59
Oiled earth	84.91	244.87	40.81	285.68
Earth	216.60	211.66	107.41	319.07
Total	2,723.52			

NOTE.—The above figures include the cutting of weeds and vegetation, cleaning of ditches and drains and maintenance of pavement.

* It should be understood that the schedule of mileage given in this tabulation is the total mileage of roads of the different types maintained during the calendar year, regardless of widths.

SNOW REMOVAL.

During the few years preceding 1923, the snow fall in this State was not sufficient to seriously interfere with traffic. In 1923, however, this became a serious problem. The plan for snow removal in 1923 was largely experimental, but the department endeavored to keep all important through routes open to traffic. In order to accomplish this, such equipment as graders, snow plows pulled by horses or caterpillar tractors, or trucks equipped with snow plow attachments were used.

RECONSTRUCTION.

With the increased volume of heavy traffic, it has been found necessary to reconstruct a small mileage of pavements which have been subjected to loads far in excess of their capacity. During 1923 the department reconstructed 5.32 miles of old pavement by replacing it with standard eighteen-foot concrete pavement.

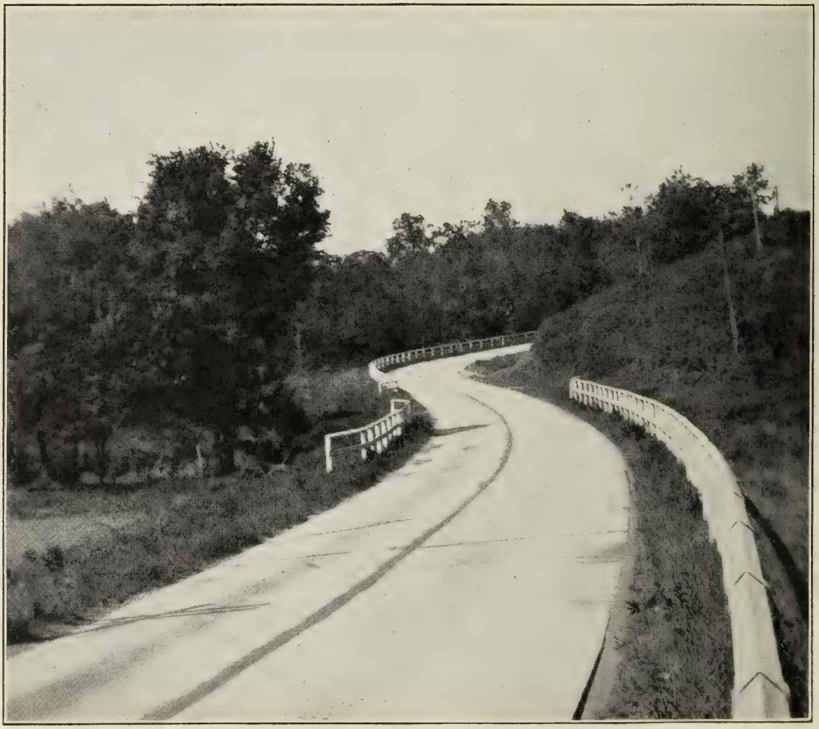


Figure 23.—View of State road showing traffic line.

ADVERTISING SIGNS.

All advertising signs of any nature are removed from the right-of-way along the State roads as soon as they are accepted for maintenance, and the placing of additional advertising signs on the right-of-way is strictly prohibited.

TRAFFIC LINE.

The new standard cross section provides for a construction joint down the center of the pavement. It is necessary to pour this joint with asphalt or tar, and, in experimenting along this line, it was found that a strip of asphalt five inches in width could be uniformly poured down the center of the pavement and serve two purposes; namely, to fill the joint, and to serve as a traffic guide line. A machine has been designed by the department for placing this traffic line. This machine is towed by the patrolman's truck and is guided from the edge of the pavement, which results in the securing of a uniform, correctly-spaced line down the center of the pavement. All pavements which were opened to traffic during the year were marked in this manner.

STATE HIGHWAY PATROL OFFICERS.

In order to enforce the provisions of the Motor Vehicle Act, the Division of Highways maintains a force of State highway patrol officers. During the first part of the year 1922 a number of men were appointed, and this number has been increased from time to time until at present the organization consists of one chief and seventy-five patrol officers.

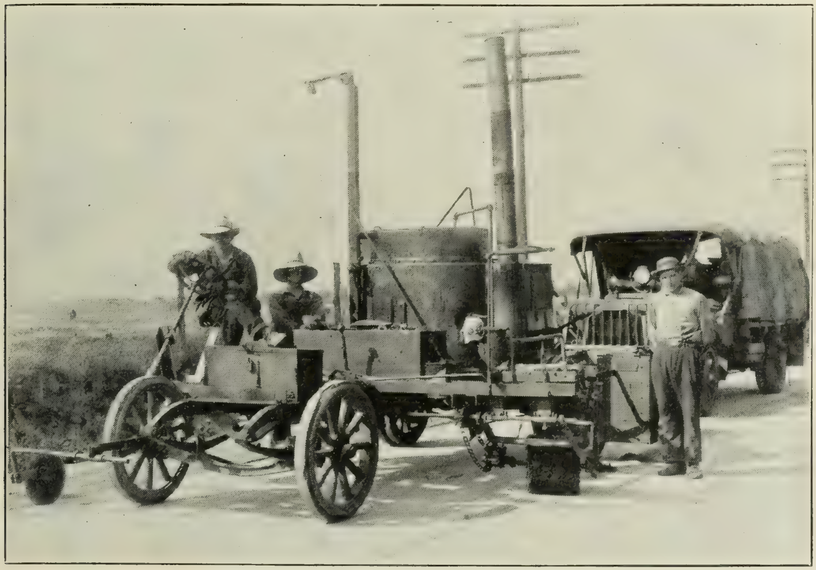


Figure 24.—Apparatus for applying traffic line.

One of the most important duties of the patrol officers is to weigh all trucks which appear to exceed the weight limitations prescribed by the Motor Vehicle Act. Second in importance is the curbing of careless or reckless driving. The patrol officers are instructed to use their authority in a conservative way, reflecting the dignity of the law which they represent, to use judgment and be courteous in all dealings with the public, and to aid law-abiding travelers by giving advice as to directions, condition of roads, location of garages, and other helpful information. During the year 1923 there were nine thousand speeders warned and 3,658 trucks weighed, resulting in one thousand and twenty-eight arrests for overloading and careless or reckless driving.

HIGHWAY MARKING SYSTEM.

The highway marking system which was adopted by the Department and outlined in the Fifth Annual Report has been brought to a high state of perfection. The following features which have been added to the marking system originally outlined, make it the most complete of any state highway department in the country:

Telegraph, telephone and light poles along the State highways have been marked with the State outline carrying the route number. The letters "L" and "R" are stenciled within the State outline where necessary to indicate the direction of curvature. Where two or more routes follow the same course, all route numbers are included in the marking. When a route is being used for a detour or temporary location, the words "Detour" or "Temporary," as the case may be, are stenciled above the State outline. The work of marking the poles over the entire system, including that within cities and villages, was completed in a period of sixty days.

Along city streets where no poles are available, signs are erected which bear the State outline and route number printed on a 2x12x20-inch board fastened to a creosoted post. This type of sign is temporary and will be replaced later with a cast iron sign fastened to a concrete post. A similar sign, which, however, is somewhat larger and bears an arrow indicating direction, is erected at right angle turns within cities or villages. Where two routes are included as shown in Figure 31, both are indicated on the sign.

Supplementing the directory information given at the city limit, a sign is also erected at prominent street corners within the city or village, indicating the direction of the route with the main objectives and the mileage thereto.

On the reverse side of all warning signs, accompanying the State outline and route number, is the statement "State Road Built by Auto Fees." This statement is used in order to acquaint the traveling public with the fact that all bond issue roads are built entirely from auto fees without any direct taxation.

All railroad signs, in addition bearing the words "Danger—Railroad," also carry the name of the railroad. Likewise, at all bridges a sign is placed bearing the name of the stream crossed.

Signs indicating direction and mileage to towns not located on the State system of highways are erected along the State routes at the intersection nearest to the towns named.

Points of historical interest which are at a distance from the improved State highways are indicated by signs erected along the State roads. The nature of the historical spot, together with the direction and mileage thereto, are both on the signs.

To the original City Limit sign there has been added the population of the city.

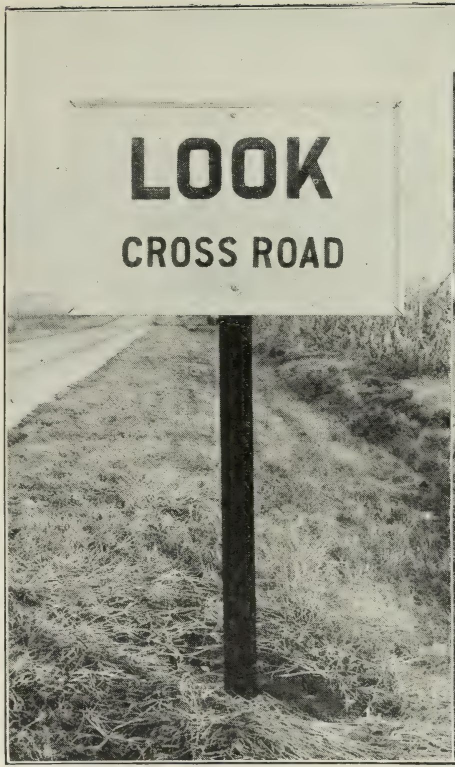


Figure 25.

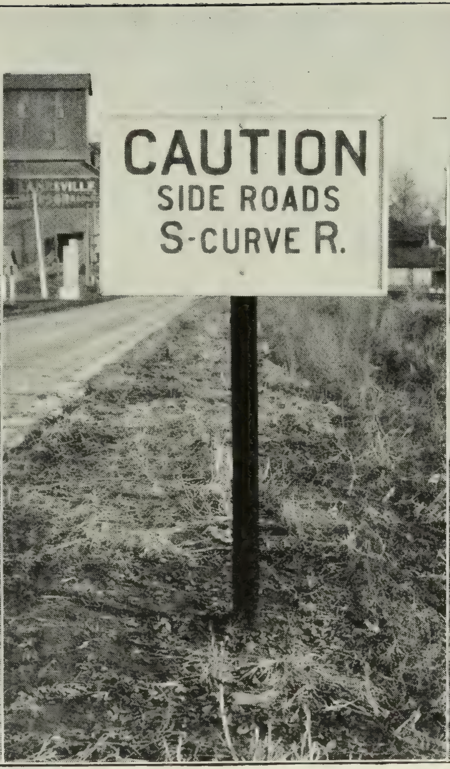


Figure 26.

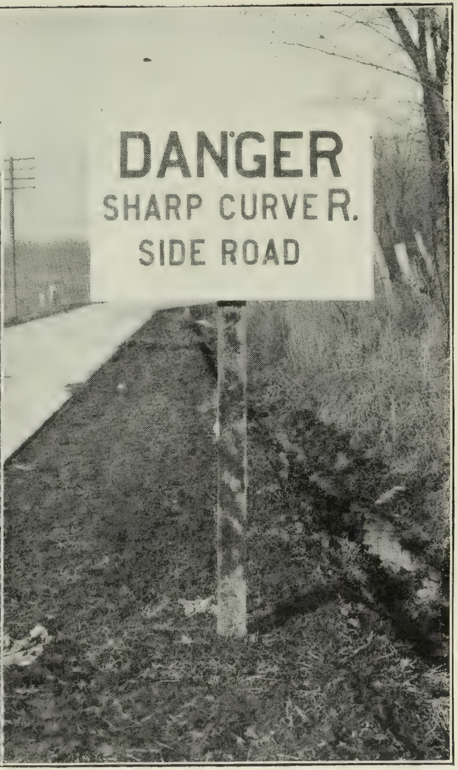


Figure 27.

WARNING SIGNS.

"Look" signs are erected where the driver need not slacken speed, but should be on his guard.

"Caution" signs are erected where some slackening of speed and a greater degree of care are necessary.

"Danger" signs are erected only where there is imminent danger; that is, where extra precaution must be taken and speed greatly reduced.

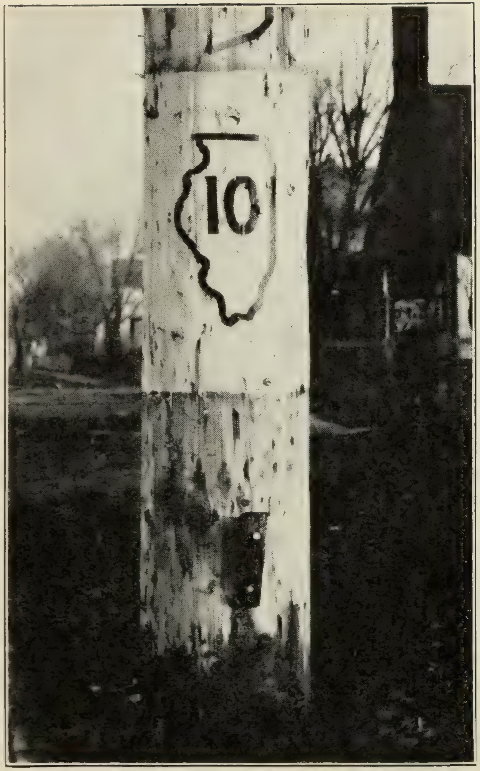


Figure 28.

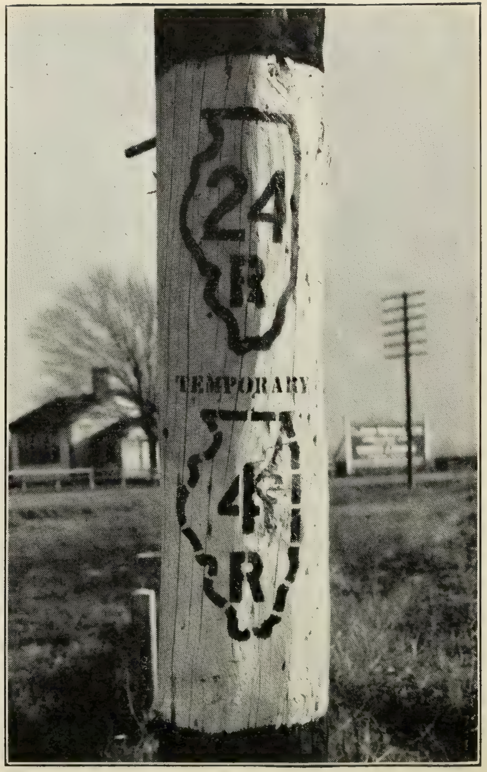


Figure 29.

METHOD OF SHOWING MARKING ON POLES ALONG ROUTE.

Outline of State carrying route number is stenciled in black on a white background on telephone, telegraph and light poles. The letters L or R indicate approach to curves. The word "Temporary" appears above the outline in the case of temporary locations of routes.

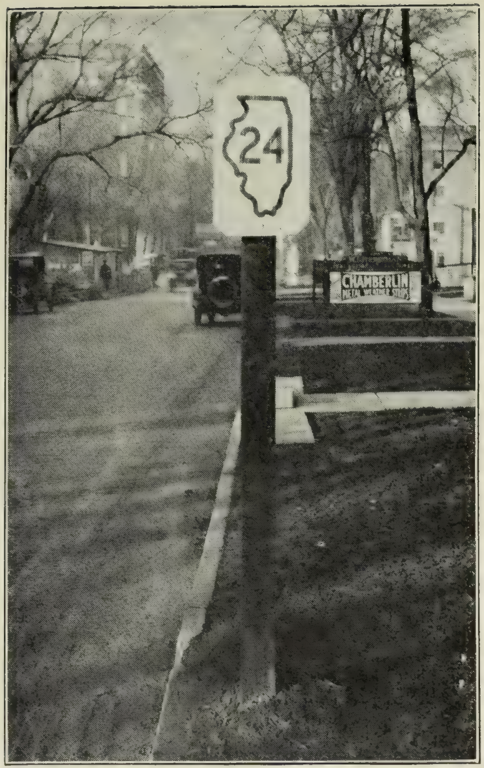


Figure 30.

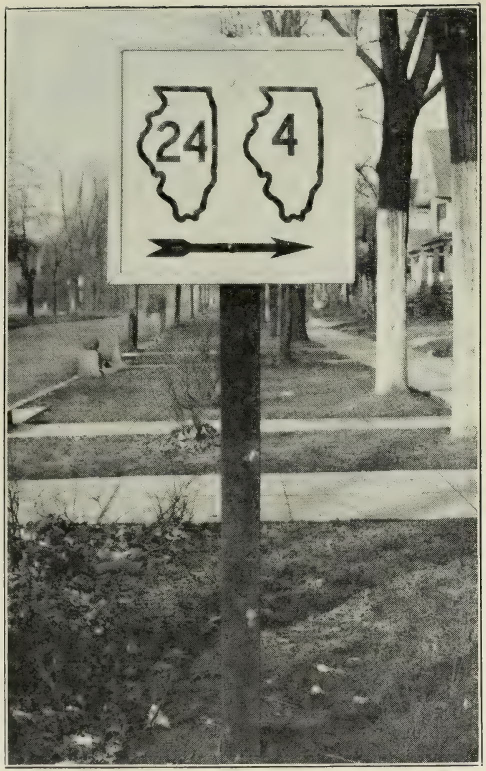


Figure 31.

DIRECTORY SIGNS ERECTED IN CITIES AND VILLAGES WHERE NO POLES ARE AVAILABLE.

The small sign is painted on a 2x12x20-inch board fastened to a creosoted post. The somewhat larger sign is erected only at right-angle turns. The double sign is used where two or more routes follow the same course. These signs will later be replaced with cast iron signs fastened to concrete posts.

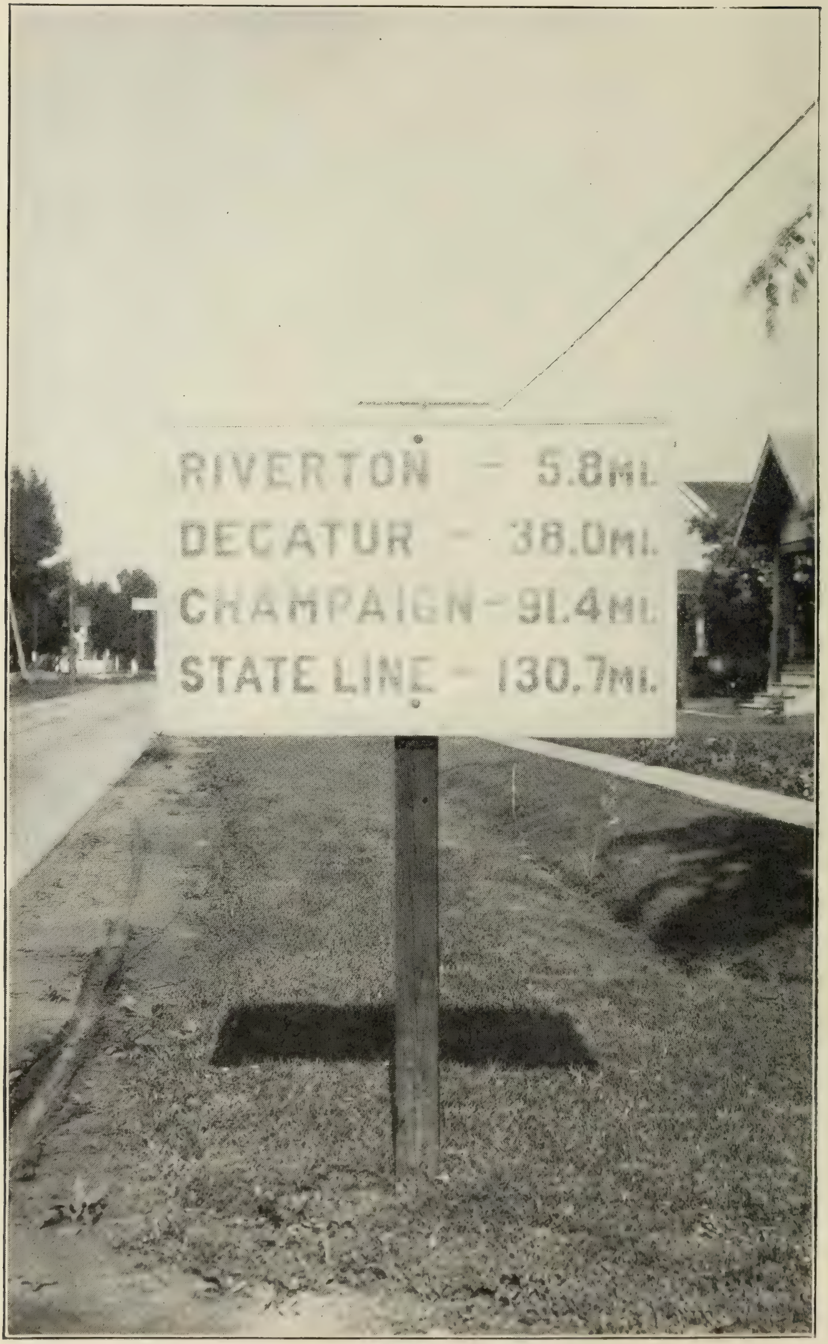


Figure 32.—Sign erected at city limit showing main objectives and distances thereto.

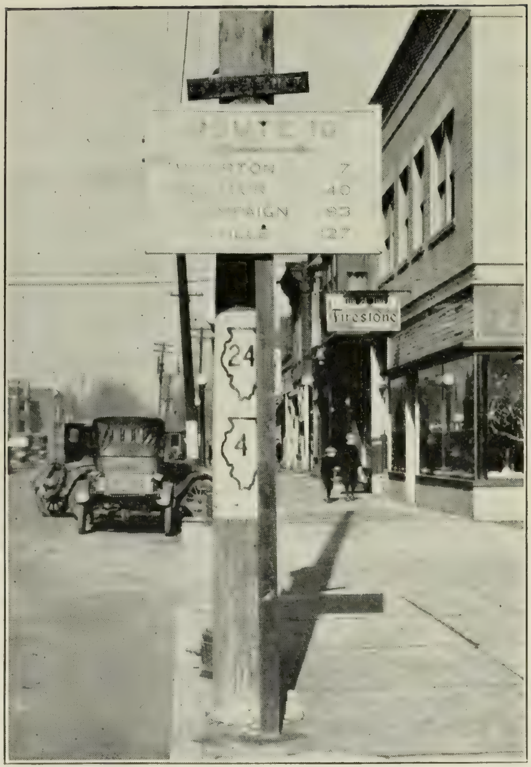


Figure 33.—Sign erected at prominent street corners, indicating direction of route and main objectives with distance thereto.

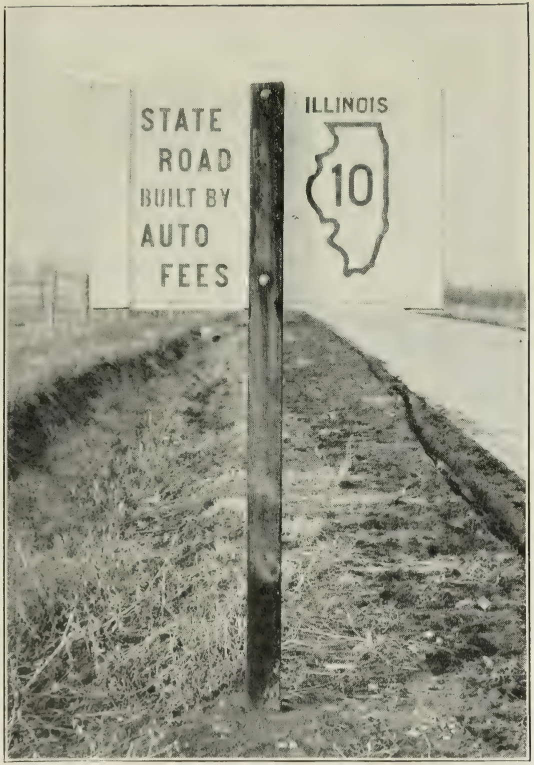


Figure 34.—"State Road Built By Auto Fees." This statement, which appears on reverse side of all warning signs, is used to acquaint the public with the fact that all bond issue roads are built entirely from auto fees without any direct taxation.

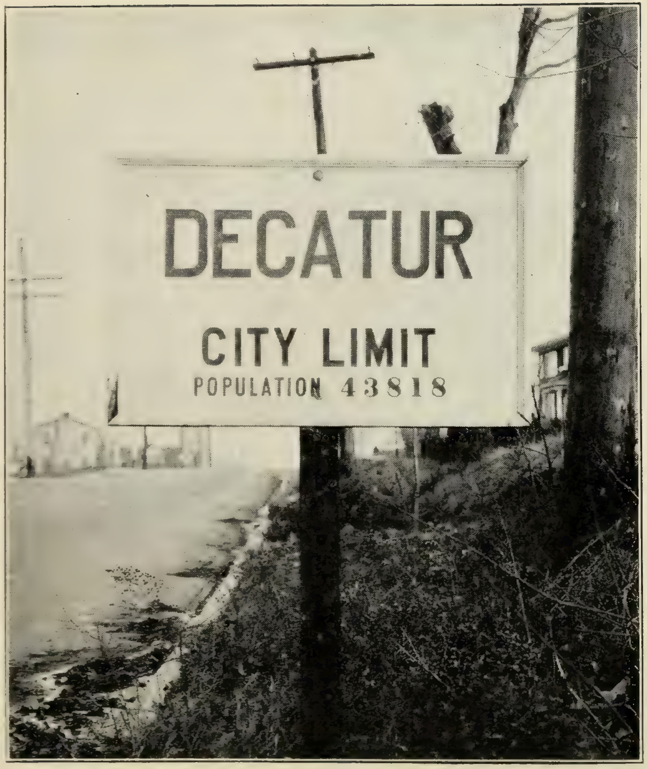


Figure 35.—City limit sign, showing population of city.

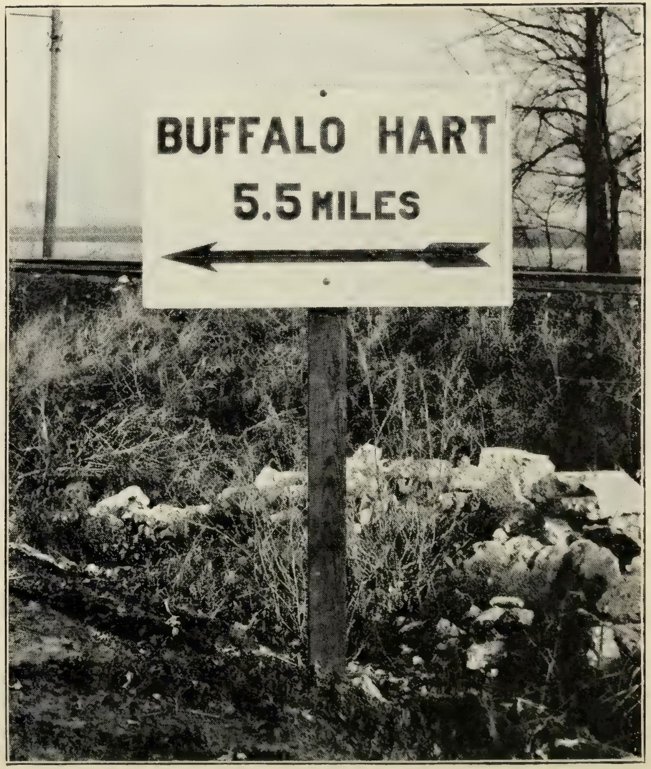


Figure 36.—Sign indicating direction and mileage to towns not located on State Highway System.

BUREAU OF MATERIALS.

As a result of the increased mileage of pavement constructed under the program of 1923, the volume of work under direction of the Bureau of Materials for the same period exhibited a corresponding increase, this additional work being distributed over the several activities in which this bureau is engaged.

During the past few years, a record of expenditures has been maintained by which expenses are distributed to the sub-department under which they occur. This record has furnished a very accurate index of the activity of each department. To show the comparison between the work of 1922 and 1923 a chart has been prepared and is included in Figure 37 showing the distribution of expense to each section. Reference to Figure 37 will show that the greatest activity was that of inspection of materials. The balance of expenditure is attributed to administration expense and the investigation of materials and problems in design and construction.

Wherever practicable, inspection has been made at the plant or point of shipment. In 1923 such inspection was made at more than 175 sources and included plants producing sand, gravel, stone, cement, brick, steel and road oil, a maximum number of 117 inspectors being placed in the field. This inspection is maintained at this maximum activity for but few months of the year, efficient district organization of the inspection forces making possible the utilization of a minimum number of employees during months of no construction. Figure 38 shows the average monthly inspections for the past three years, made on two important materials, aggregate (including sand, stone, and gravel) and cement. These charts show practically the same relative intensity of shipments for each month of the three years, with the exception of that of cement for 1923, where heavy early shipments for storage purposes are indicated by the rise in the curve for the first few months of that year.

A distinct saving over previous years on inspection cost per unit quantity of material is shown for 1923, due to the fact that the plants were working to high capacity and that no rail strike or other emergency interfered with shipments. Plant inspection of road oil, instituted in 1922 as a special service to the counties using the material, was continued during 1923 and as a result 40,000,000 gallons, representing an increase of 33% over 1922, were shipped under State inspection. Figure 39 contains several charts giving comparisons of the amounts of materials inspected during each of the past five years, including the unit costs of inspection, and, in addition, a chart showing the maximum number of employees for each year. Reference to Figure 39 shows an increase in amount of materials inspected for each year with a corresponding decrease since 1921 in cost of this inspection.

Two calyx core drills, one of which was loaned by the University of Illinois, were in operation for the major part of the year. This highly important method of testing finished pavement has been in

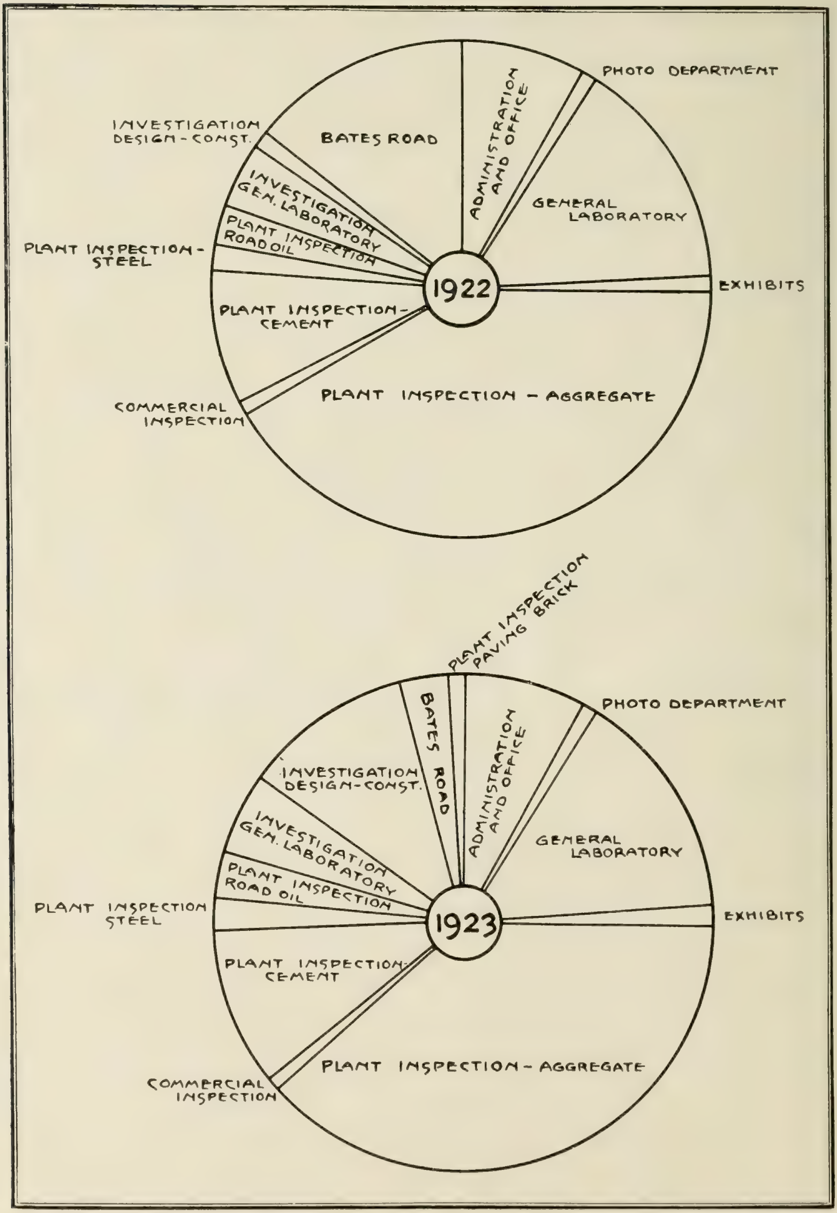


Figure 37.—Chart showing distribution of expense for Bureau of Materials during 1922 and 1923.

great demand, and has necessitated the purchase of a second drill to be operated by the State. A concrete saw for squaring the ends of these test cores has been added to the equipment of the laboratory and has been found valuable in providing a more suitable test specimen from the drilled core.

Early in the spring of 1923, at the Bates experimental road, the five sections of pavement employing the new design of cross section constructed in the fall of 1922, and 37 sections that were not total failures at the end of the 1922 traffic runs, were put under traffic test. An initial wheel load of 4,500 pounds was imposed on the old sections while traffic was begun with a 6,500-pound wheel load on the new sections. These loads were increased by 1,000-pound increments to 13,000 pounds, the equivalent of 13 tons on the rear axle of the test trucks. The section of Illinois standard design withstood without failure 700,000 tons of traffic under these loads. In

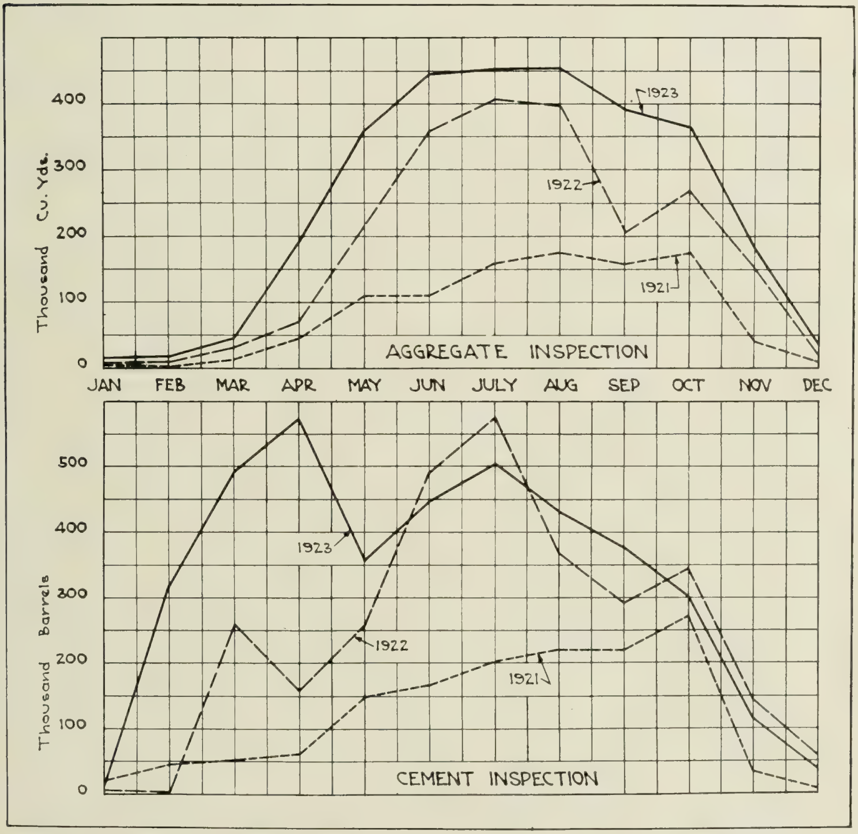


Figure 38.—Chart showing monthly variation of inspection of aggregates and cement.

addition to the regular traffic runs, miscellaneous experiments were conducted for the first few months of the year. These experiments included loading tests on corners, investigation of warping, moisture determination on subgrades, precise levels, and a series of slab loading experiments by moving, static and impact loads in which improved strain gauges were employed. After these experiments, and the completion of the traffic tests the road was reconstructed for public traffic as a part of Route 10. News Bulletin No. 8, reviewing the traffic runs of 1923 was prepared after the tests had been completed.

The department of investigation of problems in design and construction had several projects during the year on which considerable effort was spent. Early in the year a series of experiments were conducted in an attempt to perfect a strain gauge which would measure actually stresses set up in a pavement slab under all types of loads. This work resulted in considerable valuable data and the development of an instrument reasonably accurate under static load. Possibly the greatest progress made by this section was on the development of the profilometer, an apparatus for recording profile of finished pavements and detecting irregularities not allowable under specifications. Work on this apparatus is being continued, and it is expected that a machine of considerable practical value will be developed to replace the present straight edge method of examination for irregularities.

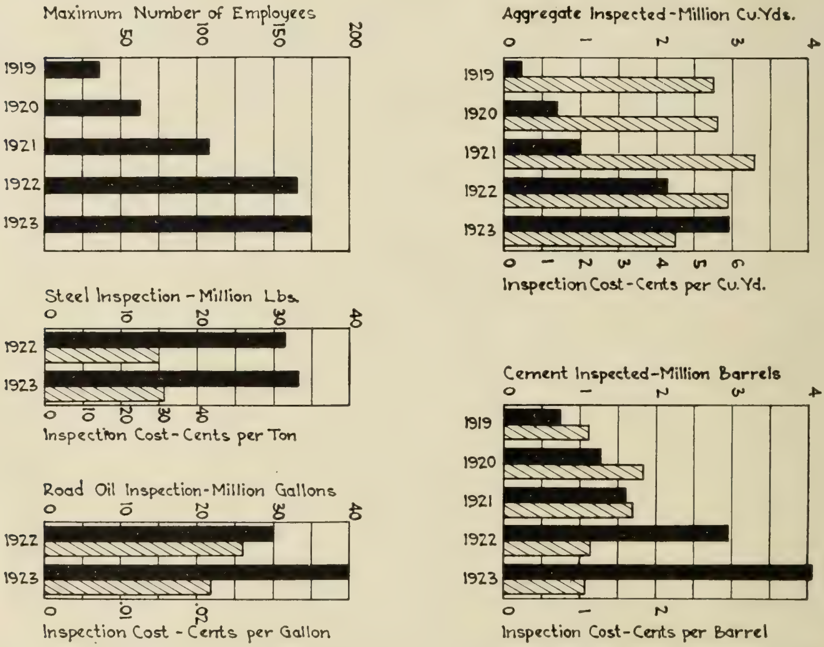


Figure 39.—Chart showing quantities and unit costs of inspection, 1919 to 1923.

In the investigation of soils, experiments were begun on each of 14 types of soil found in Illinois subgrades, the ultimate aim of these experiments being to determine the treatment necessary for each soil to provide for maximum bearing power under all moisture contents. Several new laboratory and field tests were developed during the year in this investigation.

Other problems coming to the attention of the investigational sections during the year were:

1. Pavement slab stresses.
2. Temperature gradient of concrete in pavement slab.
3. Effect of incorporated calcium chloride on electrolysis in concrete pavements.
4. Moisture determination of subgrade.
5. Investigation of cause of hair cracks.
6. Development of suitable strain gauges for stress measurements.

Research in concrete and concrete materials during the year included investigations on the following problems:

1. Gradation of aggregates.
2. Effect of impurities in aggregate.
3. Curing of concrete.
4. Properties of cement.
5. Value of various materials as concrete aggregates.
6. Fatigue of concrete.
7. Colored cements and mortars.
8. Suitability of various grades of steel for pavement reinforcing.
9. White crack filler.

Much of the research work on materials finds important application to practical problems of construction, in continually developing more efficient methods for treatment of pavement or in ascertaining the suitability of various materials for concrete aggregate. This work is often done in conjunction with the problems of various committees of technical societies such as the American Society for Testing Materials, American Society of Civil Engineers, and American Association of State Highway Officials, the work of Illinois Division of Highways occupying an important place in the proceedings of these societies. Possibly the prime development of the past two years work of the research department has been the testing and recommendation of calcium chloride for curing of pavements, over 750 miles of the 1923 program being cured by this material as a result of this recommendation.

Considerable attention has been given by the chemical section to the use of oil for maintenance of secondary roads by the counties. During the year, two experimental roads, each 3 miles in length, were established in cooperation with the county highway superintendents in Henry and Christian Counties. Results of these experiments have led to a definite recommendation of the amount, grade and nature of application of oil for the type of soils found in these two roads. In addition to the inspection of road oil, the chemical section has supervision of chemical testing of paint, cement, asphalt and water, as well as all other materials requiring chemical tests. Development of a new test for the asphalt content of the road oil that may possibly replace the present standard test, was completed during the year as a result of experimental work in this section. This department spent some time on investigation of problems on bituminous materials in cooperation with the committees of the various technical societies.

In addition to the inspection of materials for the enormous program of construction during 1923, the Bureau of Materials, through experimental work, has influenced specifications for an efficient and economical use of available highway materials in Illinois.

BUREAU OF MACHINERY.

The Bureau of Machinery was organized in 1919, and its primary purpose at that time was to receive the surplus war materials alloted to the State of Illinois, Division of Highways by the United States Department of Agriculture. The allotment of these surplus war materials was authorized by a law known as the Kahn Bill, which was passed by the Sixty-sixth United States Congress.

The work of this bureau has increased and additional duties may be enumerated as follows:

To place in good condition all mechanical appliances and supplies which are used in the Division of Highways, State institutions and the various departments of the State; also the equipment which is used for rental to contractors having State or Federal aid road contracts.

To furnish and distribute to the four day labor construction organizations and to the Maintenance Bureau such machinery and other materials, supplied from the surplus war materials, as can be used in connection with their work.

To repair and distribute trucks which are to be rented to counties, townships and State institutions.

To maintain a system of inspection of the mechanical equipment owned by the Division of Highways. Inspectors make periodical trips to determine whether the equipment is being maintained in a satisfactory manner, and to advise the lessees on the care and operation of the equipment under lease.

To maintain, under the supervision and direction of each District Engineer, a garage for the repair of the various kinds of mechanical equipment in the respective districts.

To keep a system of records of all of the materials received from the United States Department of Agriculture, and to make a report concerning its use and disposal to the United States Government.

BUREAU OF AUDITS.

ACCOUNTING AND AUDITING.

The accounting and auditing for all road and bridge revenue and expenditures accruing to or expended by the Division of Highways is the primary function of this bureau.

The accounts of the division are divided along functional lines as follows:

1. Administration and Engineering.
2. Construction, which is divided into Contract Construction accounts and Day Labor Construction accounts.
3. Maintenance, which is divided into Maintenance of Surfaced Roads accounts, Maintenance of Detours, Unpaved and Temporary Routes accounts, Additions and Betterments Cost accounts, State aid Reconstruction Cost accounts and Highway Patrol Officers Cost accounts.
4. Equipment accounts.

At the present time the accounting and auditing of bills for maintenance work is handled in the Maintenance Bureau. The same applies to the equipment accounts which are now handled by the Bureau of Machinery, and also to the day labor construction accounts which are handled under the Bureau of Construction.

The accounting and auditing of the expenditures of this division are assuming larger proportions each year, as may be seen from the statements included in this report, the total expenditures of the Division of Highways for the calendar year 1923 being approximately one-third of the entire expenditures of the State of Illinois during that year.

This bureau, in collaboration with the County Superintendents of Highways, has designed and recommended a system of accounts for the use of the various township officials throughout the State for the accounting and auditing of road and bridge revenue and expenditures in such townships.

REPORTS AND FINANCIAL ESTIMATES.

In the following pages will be found financial and statistical statements regarding the work of the Division of Highways.

The following statement represents the revenue which the division has drawn on which has accrued to the credit of the road fund.

TABLE XIII—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Total.
1911	$ 74,552.59			$ 74,552.59
1912	364,708.03			364,708.03
1913	499,802.45			499,802.45
1914	700,233.00			700,233.00
1915	903,284.09			903,284.09
1916	1,238,483.92			1,238,483.92
1917	1,629,445.26			1,629,445.26
1918	2,770,084.60		$ 85.00	2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50	3,765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68	11,111,995.56
1921	6,862,125.83	3,802,430.46	221,645.55	10,886,201.84
1922	7,904,219.71	1,733,334.86	132,495.77	9,770,050.34
1923	9,677,318.64	4,257,276.06	127,847.10	14,062,441.80
Total	$41,716,751.31	$15,517,840.43	$542,378.60	$57,776,970.34

The following represents the appropriations which have been made by the General Assembly from the road fund.

TABLE XIV—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For maintenance.	For State highways.	For county refunds.	For cement plant.	For Fay Hunsley Relief.	For gravel plant.	Interest on highway bonds.	Totals.
1913	$ 400,000.00									$ 400,000.00
1914	700,000.00									700,000.00
1915	1,000,000.00									1,000,000.00
1916	1,000,000.00									1,000,000.00
1917	1,200,000.00	$ 1,326,000.00								2,526,000.00
1918										
1919	500,000.00	26.600,000.00						$125,000.00		27,225,000.00
1920										
1921			$3,000,000.00	$20,000,000.00	$3,889,382.23	$5,000,000.00	$4,000.00		$1,000,000.00	32,893,382.23
1922										
1923			3,000,000.00	20,000,000.00	4,025,632.56	5,000,000.00			4,000,000.00	36,025,632.56
Total	$4,800,000.00	$27,926,000.00	$6.000,000.00	$40,000,000.00	$7,915,014.79	$10,000,000.00	$4,000.00	$125,000.00	$5,000,000.00	$101,770,014.79

The following represents the expenditures from the road fund shown under the proper appropriations.

TABLE XV—TOTAL ANNUAL EXPENDITURES FROM ROAD FUND SHOWN UNDER PROPER APPROPRIATION.

Year.	State aid.	Federal aid.	State highways.	Maintenance.	Refunds to counties.	Fay Hunsley Relief.	Interest and principal on highway bonds.	Total expenditures.
1914	$ 364,202.39							$ 364,202.39
1915	662,516.23							662,516.23
1916	681,248.36							681,248.36
1917	1,141,567.05							1,141,567.05
1918	393,424.40	$ 190,578.78						584.003.18
1919	623,117.27	4.352,870.62						4,975,987.89
1920	472,568.30	11,108,931.33						11,581,499.63
1921	248,088.68	7,407,287.97	$4,526,651.22	$ 225,737,08	$ 719,273.18	$4,000.00		13,131,038.13
1922	32,784.91		6,837,603.37	640,486.78	1,798,184.50		$757,460.00	10,066,519.56
1923	25,975.27		9,234,214.69	1,110,209.41	1,411,337.49			11,781,736.86
Total	$4,645,492.86	$23.059,668.70	$20,598,469.28	$1,976,433.27	$3,928,795.17	$4,000.00	$757,460.00	$54,970,319.28

The following represents the arrangement of the retirement and interest payments on the $42,000,000.00 in highway bonds which have been sold to December 31, 1923 of the $60,000,000.00 bond issue which was voted by the people on November 4, 1918.

TABLE XVI—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $42,000,000.00—4% BONDS ISSUED TO DATE.

Total bonds voted Nov. 4, 1918	$60,000,000.00
Total bonds authorized for sale	60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each year.
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		1,680,000.00	1,680,000.00	3,840,000.00
1926	$2,000,000.00	1,680,000.00	3,680,000.00	7,520,000.00
1927	2,000,000.00	1,600,000.00	3,600,000.00	11,120,000.00
1928	2,000,000.00	1,520,000.00	3,520,000.00	14,640,000.00
1929	2,000,000.00	1,440,000.00	3,440,000.00	18,080,000.00
1930	2,000,000.00	1,360,000.00	3,360,000.00	21,440,000.00
1931	2,000,000.00	1,280,000.00	3,280,000.00	24,720,000.00
1932	2,000,000.00	1,200,000.00	3,200,000.00	27,920,000.00
1933	2,000,000.00	1,120,000.00	3,120,000.00	31,040,000.00
1934	2,000,000.00	1,040,000.00	3,040,000.00	34,080,000.00
1935	2,000,000.00	960,000.00	2,960,000.00	37,040,000.00
1936	2,000,000.00	880,000.00	2,880,000.00	39,920,000.00
1937	3,000,000.00	800,000.00	3,800,000.00	43,720,000.00
1938	3,000,000.00	680,000.00	3,680,000.00	47,400,000.00
1939	3,000,000.00	560,000.00	3,560,000.00	50,960,000.00
1940	3,000,000.00	440,000.00	3,440,000.00	54,400,000.00
1941	3,000,000.00	320,000.00	3,320,000.00	57,720,000.00
1942	3,000,000.00	200,000.00	3,200,000.00	60,920,000.00
1943	2,000,000.00	80,000.00	2,080,000.00	63,000,000.00
Total	$42,000,000.00	$21,000,000.00	$63,000,000.00	$63,000,000.00

TABLE XVI—Continued.

SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sale—Oct. 25, 1921. Date of issue—Nov. 1, 1921. Rate $94.020. Interest yield 4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$ 100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE XVI—Continued.

SERIES NO. 2—$6,000,000.00—4% BONDS.

Date of sale—Apr. 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Interest yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE XVI—Continued.

SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue—May 1, 1922. Rate $99.688. Interest yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200.000.00	700,000.00	3,600,009.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE XVI—Continued.

SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—Mar. 1, 1923. Rate $98.183. Interest yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable to Mar. 1 each year.
1924		$240,000.00	$ 240,000.00	$ 240,000.00
1925		240,000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1922		240,000.00	240,000.00	2,400,000.00
1934		240.000,00	240,000.00	2.640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120,000.00
1937		240,000.00	240,000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000,000.00	160,000.00	1,160,000.00	6,960,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	9,160,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE XVI—Continued.

SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Interest yield 4.40.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$ 280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	$ 500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220,000.00	720,000.00	3,560,000.00
1930	500,000.00	200,000.00	700,000.00	4.260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600,000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1,000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40,000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE XVI—Continued.

SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16, 1923. Date of issue—Oct. 1. 1923. Rate $94.41. Interest yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580 000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE XVI—Concluded.

SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Interest yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable to Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1919		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

The following statement represents the revenue derived from the sale of $42,000,000.00 in bonds:

TABLE XVII—BOND FUND REVENUE DEPOSITED WITH STATE TREASURY.

Year sold.	Date sold.	Amount sold.	Total amount derived.	Total deposited in bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	$5,000,000.00	$4,709,477.78	$4,709,477.78	None
1922	Sept. 18	6,000,000.00	6,083,855.65	6,083,855 65	None
1922	Apr. 13	6,000,000.00	5,940,111.11	5,940,111.11	None
1923	Feb. 20	6,000,000.00	5,908,333.34	5,908,333.34	None
1923	May 25	7,000,000.00	6,837,667.68	6,837,667.68	None
1923	Oct. 16	6,000,000.00	5,687,266.68	5,687,266.68	None
1923	Dec. 22	6,000,000.00	5,678,266.67	5,667,600.00	$10,666.67
Total		$42,000,000.00	$40,844,978.91	$40,834,312.24	$10,666.67

The following statement shows the appropriations which have been made by the General Assembly of bond issue funds:

TABLE XVIII—APPROPRIATIONS PAYABLE FROM BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922			
1923	30,000,000.00		30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

The following statement represents the annual expenditures which have been made from the State bond road fund for the years 1921 to 1923 inclusive:

TABLE XIX—ANNUAL EXPENDITURES FROM THE STATE BOND ROAD FUND.

Year.	Administration and Engineering.	Construction.	Refunds to counties.	Equipment.	Total.
1921	$186,670.91	$ 2,196,414.38	$ 8,000.00	$ 77,915.36	$ 2,469,000.65
1922	879,315.90	11,275,051.11	637,820.93	266,344.48	13,058,532.42
1923	934,922.43	17,489,196 04	605,182.71	182,938.93	19,212,240.11
Total	$2,000,909.24	$30,960,661.53	$1,251,003.64	$527,198.77	$34,739,773.18

The following statement is a summarized report of appropriations made by the General Assembly payable to the order of the Division of Highways, State Treasurer and the Department of Public Works and Buildings for the years 1913 to 1923 inclusive from the road, Federal aid road and State bond road funds.

The following is a summarized statement of the revenue and expenditures made from the road, Federal aid road and State bond road funds during the years 1911 to 1923 inclusive.

TABLE XX.—STATEMENT OF REVENUE AND EXPENDITURES FROM ROAD, FEDERAL AID ROAD AND STATE BOND ROAD FUND.

1. REVENUE—1911 to 1923, Inc.—			
From motor license fees	$41,716,751.31		
*Bond sales	35,166,712.24		
Federal aid received	15,517,840.43		
Miscellaneous receipts	542,378.60		
Total revenue			$92,943,682.58
2. EXPENDITURES—1911 to 1923, Inc.—			
For Construction—			
State aid	$ 3,801,433.55		
Federal aid	20,922,388.74		
Bond issue	49,551,189.80		
Total		$74,275,012.09	
Administration and engineering		5,673,322.22	
Equipment		1,314,317.98	
Maintenance		2,506,181.36	
Interest on highway bonds		757,460.00	
Refunds to counties		5,179,798.81	
Fay Hunsley Relief—(Special appropriation by Legislature)		4,000.00	
Total all expenditures			89,710,092.46
3. BALANCE IN TREASURY DEC. 31, 1923			$3,233,590.12
*NOTE.—Proceeds of Bond Sale Dec. 22, 1923, has not been received on Dec. 31, 1923.			
RECONCILMENT OF HIGHWAY STATEMENT WITH STATE TREASURER'S REPORT JAN. 1, 1924—			
Balance in Road Fund Jan. 1, 1924		$2,963,380.08	
Balance in Bond Fund Jan. 1, 1924		893,309.94	
Balance in both funds Jan. 1, 1924			3,856,690.02
Deduct—			
Outstanding warrants Road Fund Jan. 1, 1924		$116,805.35	
Outstanding warrants Bond Fund Jan. 1, 1924		167,221.29	284,026.64
Net treasury balance road and bond Jan. 1, 1924			$3,572,663.38
Deduct—			
Vouchers in transit Jan. 1, 1924			339,073.26
Net Road and Bond Fund balance Jan. 1, 1924			$3,233,590.12

The following statement (Table XXI) represents the annual expenditures from the road and bond road funds made on the order of the Division of Highways for the calendar years 1914 to 1923 inclusive.

It will be noted that approximately 77½% of the total funds expended by the Division of Highways from the road and bond funds from 1914 to 1923, inclusive, were expended during the years 1921, 1922 and 1923. It will also be noted that the average per cent of overhead for the division during this ten year period was 6.38% and that 89.32% of the total money expended during these years was expended for construction purposes.

The following statement (Table XXII) is a comparison of total expenditures for the Division of Highways from all appropriations and funds for the calendar years 1920, 1921, 1922 and 1923 with percent ages of monthly expenditures shown in relation to the total for each year.

TABLE XXI—TOTAL ANNUAL EXPENDITURES FROM THE ROAD AND BOND ROAD FUNDS BY THE DIVISION OF HIGHWAYS FOR THE YEARS 1914 TO 1923, INCLUSIVE.

Year.	Administration and engineer.	Construction.	Maintenance.	County refunds.	Equipment.	Total.	Per cent.
1914		$ 364,202.39				$ 364,202.39	.41
1915	$ 23,041.35	629,603.38	$ 9,871.50			662,516.23	.73
1916	3,920.88	656,641.05	20,686.43			681,248.36	.77
1917	113,467.75	992,567.04	35,532.26			1,141,567.05	1.28
1918	21,896.36	524,802.84	37,303.98			584,003.18	.66
1919	501,811.85	4,323,274.23	84,614.37		$ 66,287.44	4,975,987.89	5.59
1920	813,942.05	10,318,517.96	208,802.55		240,237.07	11,581,499.63	13.02
1921	922,291.64	13,279,258.94	358,657.85	$ 727,273.18	308,557.17	15,596,038.78	17.53
1022	1,337,751.29	17,573,666.06	640,503.01	2,436,005.43	379,666.19	22,367,591.98	25.16
1923	1,935,199.05	25,612,478.20	1,110,209.41	2,016,520.20	319,570.11	30,993,976.97	34.85
Total	$5,673,322.22	$74,275,012.09	$2,506,181.36	$5,179,798.81	$1,314,317.98	$88,948,632.46	
Per cent	6.38	83.50	2.82	5,82	1.48		100.00

TABLE XXII—COMPARISON OF TOTAL EXPENDITURES ALL FUNDS WITH RATIOS.

	1920.	Monthly per cent of total.	1921.	Monthly per cent of total.	1922.	Monthly per cent of total.	1923.	Monthly per cent of total.	Total.	Monthly per cent of total.
January	$ 318,086.05	2.72	$ 790,619.34	5.04	$ 771,740.43	3.44	$ 752,978.66	2.43	$2,633,424.48	3.26
February	195,389.01	1.67	594,405.38	3.79	415,476.44	1.85	1,163,351.98	3.75	2,368,622.81	2.93
March	323,713.07	2.77	703,592.41	4.48	1,016,990.06	4.53	1,890,509.12	6.09	3,934,804.66	4.87
April	310,521.34	2.66	648,326.61	4.13	847,449.13	3.77	1,668,267.59	5.37	3,474,564.67	4.30
May	685,642.93	5.87	1,141,060.22	7.27	1,623,975.48	7.23	2,493,564.15	8.03	5,944,242.78	7.35
June	1,104,400.88	9.45	1,879,929.53	11.98	2,724,384.23	12.13	3,419,818.32	11.02	9,128,532.96	11.29
July	1,378,270.10	11.79	1,650,383.40	10.52	3,485,829.92	15.52	3,832,940.41	12,35	10,347,423.83	12.79
August	1,300,523.50	11.13	2,067,640.53	13.17	3,267,294.76	14.55	4,115,100.96	13.26	10,750,559.75	13.29
September	1,658,851.79	14.20	1,908,665.78	12.16	2,411,038.51	10.74	3,972,466.54	12.80	9,951,022.62	12.30
October	1,924,290.10	16.48	1,995,648.22	12.72	2,389,549.29	10.64	1,881,532.49	6.06	8,191,020.10	10.13
November	1,184,695.78	10.14	1,264,658.68	8.06	2,162,187.90	9.63	3,761,878.20	12.12	8,373,420.58	10.35
December	1,299,689.04	11,12	1,049,918.87	6.68	1,337,744.36	5.97	2,089,460.87	6,72	5,776,813.14	7.14
Total	$11,684,073.59	100.00	$15,694,848.97	100.00	$22,453,660.51	100.00	$31,041,869.31	100.00	$80,874,452.38	100.00

The following statement represents the collection of motor license fees by months during the calendar years 1920, 1921, 1922 and 1923.

TABLE XXIII—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Month.	1920.	1921.	1922.	1923.
January	$2,470,979.84	$2,897,758.72	$3,252,174.66	$4,014,285.44
February	937,970.90	1,264,773.15	1,471,791.61	1,740,113.23
March	800,893,81	994,152.02	966,026.65	1,143,169.52
April	584,708.86	519,878.43	589,703,34	814,812.00
May	391,175.25	333,460.17	586,177.70	660,851.24
June	237,200.75	224,359.11	322,684.94	381,256.39
July	204,069.15	215,506.11	271,588.96	349,875.26
August	115,311.29	146,948.37	170,736.44	213,537.77
September	78,907.98	99,263.82	115.170.49	131,154.87
October	65,027.64	67,870.65	80,244.66	109,111.62
November	23,475.10	30,341.09	44,282.04	53,007.85
December	5,984.60	8,996.83	11,900.53	19,192.58
Total	$5,915,705.17	$6,803,307.47	$7,882,482.02	$9,630,367.77
Refunds	22,119.15	26,526.30	21,270.81	----------------
Total	$5,893,586.02	$6,776,781.17	$7,861.211.21	$9,630,367.77

The following statement represents the collection of motor license fees by counties for the calendar years 1920, 1921, 1922 and 1923.

TABLE XXIV—SCHEDULE OF MOTOR FEES BY CONUTIES AS COLLECTED BY SECRETARY OF STATE.

Counties.	1920.	1921.	1922.	1923.
Cook	$1,846,232.75	$2,013.788 25	$2,335,925.75	$3,230,180.00
Adams	66,787.63	78,597.00	91,174.25	114,990.00
Alexander	12,663,25	14,902.00	17,286.75	21,980.00
Bond	14,707.46	17,307.75	20,077.50	26,995.00
Boone	24,261,01	28,550.50	33,119.25	33,982.00
Brown	11,943.50	14,055.00	16,304.00	16,450.00
Bureau	66,748.00	78,549.75	91,124.75	92,866.00
Calhoun	7,319.00	8,613.81	9,991.50	9,824.00
Carroll	34,032.00	39,976.25	46,373.50	46,841.00
Cass	25,909.00	30,488.75	35,367.50	38,884.00
Champaign	102,381.25	120,484.25	139,764.50	139,863.00
Christian	51,608.75	60,733.50	70,452.00	69,520.00
Clark	24,196.00	28,476.00	33,036.50	39,452.00
Clay	11,908.75	14,014.35	16,257.00	18,898.00
Clinton	18,462.00	21,724.50	25,197.00	31,880.00
Coles	43,166.50	50,798.75	58,928.00	66,590.00
Crawford	37,385.00	43,994.85	51,034.00	52,337.00
Cumberland	11,690.25	13,756.75	15,958.25	16,270.00
DeKalb	59,428.50	69,836.50	81,127.75	81,480.00
DeWitt	30,457.00	35,842.50	41,578.50	40,442.00
Douglas	35,323,35	41,568.75	48,220.75	45,338.00
DuPage	41,776.50	49,280.75	57,166.75	103,110.00
Edgar	40,805.50	48,020.25	55,704.75	54,965.00
Edwards	8,689.75	10,226.25	11,838.00	14,496.00
Effingham	14,511.50	17,077.50	19,810.25	28.730.00
Fayette	18,179.75	21,394.25	24,817.75	26,792.00
Ford	34,067.75	40,091.50	46,507.00	41,961.00
Franklin	29,823.50	35,097.00	40,713.25	85,715.00
Fulton	65,688.25	77,302.75	89,673.00	96,990.00
Gallatin	7,060.00	8,308.25	9,637.75	10,729.00
Greene	22,233.00	26,165.25	30,352.00	32,874.00
Grundy	27,088,50	31,877.75	36,978.75	37,441.00
Hamilton	4,802.50	5,651.75	6,556.50	10,722.00
Hancock	48.637.25	57,236.75	66,395.75	68,388.00
Hardin	1,963.50	2,311.00	2,680.75	3,760.00
Henderson	14,196.75	16,724.50	19,400.50	18,977.00
Henry	80,194.25	94,373.50	109,440.25	110,333.00
Iroquois	71,832,75	84,533.50	98,057.75	86,950.00
Jackson	21,479.50	25,277.50	29,317.75	49,461.00

TABLE XXIV—Concluded.

Counties.	1920.	1921.	1922.	1923.
Jasper	$ 11,523.00	$ 13,560.50	$ 15,703.25	$ 19,615.00
Jefferson	14,286.68	16,812.50	19,503.75	35,570.00
Jersey	10,676.25	12,564.25	14,572.75	16,711.00
JoDaviess	32,225.00	37,922.75	43,990.50	43,855.00
Johnson	4,518.29	5,319.75	6,169.50	9,444.00
Kane	111,164.00	130,819.25	151,751.75	199,250.00
Kankakee	61,957.00	72,911.25	84,577.50	86,966.00
Kendall	20,063.00	23,610.25	27,387.50	24,008.00
Knox	61,168.00	71,983.40	83,500.75	104,340.00
Lake	66,035.50	77,709.35	90,144.50	126,931.00
LaSalle	121,495.25	142,976.50	165,852.00	174,960.00
Lawrence	30,168.75	35,512.40	41,184.75	41,900.00
Lee	52,073.00	61,276.00	71.080.00	72,440.00
Livingston	75,454.85	88,796.10	103,153.50	94,585.00
Logan	49,345.00	58,070.00	67,362.75	64,210.00
Macon	79,175.50	93,173.85	108,078.50	125,455.00
Macoupin	47,571,00	55,982.75	64,940.50	88,980.00
Madison	84,326.50	99,232.15	115,110.50	172,910.00
Marion	24,157.25	28.428.50	32,976.75	60,221.00
Marshall	26,189.75	30,820.75	35,751.75	31,410.00
Mason	29,276.75	34,446.50	39,958.52	40,112.00
Massac	7,692.75	9,053.75	10,500.50	12,920.00
McDonough	44,369.75	52,215.00	60,568.75	61,133.00
McHenry	56,069.80	65,985.50	76,540.22	81,911.00
McLean	119,340.25	140,441.75	162,913.75	160,871.00
Menard	17,183.00	20,221.30	23.456.75	24,955.00
Mercer	39,052.50	45,960.00	53,313.75	50,127.00
Monroe	12,715,25	14,962,50	17,356.50	22,260.00
Montgomery	43,686.00	51,421.60	59,649.75	71,008.00
Morgan	36,808.00	43,317.00	50,246.75	57,004.00
Moultrie	21,098.75	24,829.75	28,802.50	26,980.00
Ogle	53,478.50	62,936.00	73,006.00	73,120.00
Peoria	130,444.25	153,328.50	178,061.25	235,866.00
Perry	13,890.00	16,345.50	18,960.25	33,783.00
Piatt	34,758.50	40,904.50	47,449.25	41,200.00
Pike	21,575.75	25,392.50	29,454.57	41,944.00
Pope	3,420.75	4,025.50	4,668.50	4,895.00
Pulaski	6,833.50	8,043.75	9,330.25	13,700.00
Putnam	8,142.25	9,582.50	11,115.75	12,622.00
Randolph	19,860.50	23,373.00	27,113.25	43,117.00
Richland	14,609.25	17,192.50	19,943.75	21,933.00
Rock Island	101,622.50	119,603.50	138,742,50	156,847.00
Saline	21,271.75	25,040.00	29,043.25	52,670.00
Sangamon	116,830.00	137,482.00	159,487.25	174,911.00
Schuyler	14,580.50	17,160.50	19,903.50	23,574.00
Scott	12,116.00	14.258.00	16.539.00	16,788.00
Shelby	36.132.75	42,517.50	49,320.25	49,311.00
Stark	21,575.75	25,392.50	29,455.00	28,448.00
St. Clair	97,571,00	114,818.75	133,191.50	209,376.00
Stephenson	54,238.25	63,830.50	74,043.75	89,550.00
Tazewell	52,716.40	62,054.00	71,984.00	70,121.00
Union	10.479.50	12,331.75	14,306.50	19,005.00
Vermilion	97,896.50	115,205.25	133,640.00	158,980.00
Wabash	12,507.50	14,718.75	17,073.54	20,441.00
Warren	37,681.50	44,539.75	51,434.75	59,622.00
Washington	16,975.75	19,977.75	23,174.00	27,791.00
Wayne	12,092.75	14,231.25	16,507.50	20,282.00
White	16.480.25	19,394.75	22,496.75	23,612.00
Whiteside	66,643.50	78,427.50	90,977.81	95,887.00
Will	91,215.00	107,350.50	124,527.25	165,282.00
Williamson	36,552.75	43,011.50	49,894.00	97,599.00
Winnebago	115,062.05	135,406.75	157,073.75	175,678.00
Woodford	43,823.00	51,557.51	59,844.55	51,914.77
Total	$5,893,586.02	$6,776,781.17	$7,861,211.21	$9,630,367.77

RECORDING AND HANDLING OF VOUCHERS.

During the calendar year 1923 the Division of Highways scheduled 45,105 vouchers payable from the bond road and road funds. These vouchers cover the payment of cement distributed to the various State road contracts, the payment to contractors for work performed, the payment of salaries to employees and the expense accounts of same and miscellaneous bills and invoices incurred by the various sections of the division.

REQUESTS FOR REQUISITIONS AND SUPPLIES.

All supplies and equipment desired by any section of the division is requested through the Bureau of Audits where requisitions are issued on the Division of Purchases and Supplies. A follow-up system is maintained on all requisitions and purchase orders for the delivery of goods requested. This division of the work is considerable and it is estimated that approximately 250,000 invoices and bills are handled through this bureau annually.

RECORDING AND DEPOSITING REVENUE ACCRUING TO DIVISION OF HIGHWAYS.

All moneys or funds accruing to any section of the division is forwarded to this bureau where a register is kept of same and deposits are prepared and forwarded to the State Treasurer.

The following statement represents the collections by the Division of Highways for the calendar year of 1923.

TABLE XXV—STATEMENT SHOWING COLLECTION BY THE DIVISION OF HIGHWAYS FROM JANUARY 1, 1923, TO DECEMBER 31, 1923.

Month.	Engineering.	Construction.	Maintenance.	Equipment.	Total.
January	$ 718,54	$4,245.20	$ 358,02	$ 6,067.63	$11,389.39
February	4,005.75	2,317.10	151,92	3,098.19	9,572.96
March	528.65	10.70	174.42	5,048.10	5,761.87
April	392.43	17.72		2,609.17	3,019.32
May	11,426.06	.49	31.78	13,257.43	24,715.76
June	1,325.01	590.64		10,992.41	12,908.06
July	794.58	975.85	343.93	5,906.93	8,021.29
August	993.23	622.00	32.26	3,223.73	4,871.22
September	738.60	2,661.92		8,923.82	12,324.34
October	1,083.09	9,438.64	2,734.82	2,058.26	15,314.81
November	3,528.21	2,898.08	462,69	749.53	7,638.51
December	962.85	8,356.28	2,998.38	5,727.86	18,045.37
Total	$26,497.00	$32,134.62	$7,288.22	$67,662.06	$133,582.90

This revenue is derived from machinery rentals, testing and engineering services rendered and refunds in connection with purchase of construction and maintenance materials.

CONTRACTORS' FINANCIAL STATEMENTS.

All statements showing the financial condition of contractors' accounts, where they have become involved in bankruptcy proceedings, defaults, or otherwise, are prepared in this bureau.

HIGHWAY STATISTICS.

Numerous demands are made upon this bureau for the preparation of statistics relating to highway financing, organization, construction and maintenance. These requests originate from the various State officials, legislators, highway departments of other states, corporations, companies and individuals; and since it is found in this work that statistics may be kept in innumerable ways, this part of the work involves considerable care and attention.

DISTRIBUTION OF CEMENT TO STATE CONTRACTS.

During the year 1923 the State contracted for approximately 3,000,000 barrels of cement, all of which was delivered to approximately 275 road and bridge contracts in the State.

The recording and following of the final disposition of the cars shipped to the various sections, as well as the final check with the laboratory and District Engineers on shipments and transfers to and from various sections, involves a vast amount of work. A complete record of each car shipped to each construction job in the State, as well as the transfers which are made by the contractors to and from the various sections, are followed and finally adjusted in this bureau.

A check is also maintained on the cement sacks which are charged to the various sections, the value of which are deducted from the amount due the contractors on estimates.

RECEIVING AND RECORDING OF LIENS AND CLAIMS.

All liens and claims filed against contractors engaged in State road work are received, recorded and filed in this bureau. A detailed record is kept of the claims filed against each contractor on each section of work under contract, as well as a register of liens and claims filed against all contractors. The handling and recording of liens and claims involves a vast amount of correspondence and following up.

CONTRACTORS' BONDS.

All bonds furnished by contractors, either personal or surety, are checked in this bureau for legal requirements and for being properly filled out. The financial condition of contractors is also investigated by this bureau prior to the awarding of contracts.

PERMITS AND FRANCHISES.

All matters pertaining to permits, franchises, or other privileges to make use of State highways for various purposes are carefully investigated as to their desirability and legal aspects, and are approved by this bureau before being finally approved by the Superintendent of Highways and the Director of the department.

PROPERTY RENTALS OR LEASES.

Arrangements for the renting or leasing of buildings or ground used by the various sections of the Division of Highways are made by this bureau, where a record is also kept of such rented or leased property. This record shows complete information covering all matters pertaining to the leases or rentals.

BLUE PRINTING, SUPPLIES, MAIL, ETC.

This bureau receives, uncrates or unpacks all incoming supplies or engineers' equipment, and also handles the outgoing supplies distributed to the various districts and bureaus.

It also handles and proof reads all mimeograph, ditto, addressograph or printing of the division. All blue printing of the Bureau of Design, the Bureau of Maintenance and other sections of the division are handled by this bureau.

All incoming and outgoing mails is received and distributed by this bureau.

THE LIBRARY OF THE
MAR 29 1938
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SEVENTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

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January 1, 1924
TO
December 31, 1924

AUG. 26TH 1818

C. R. MILLER, Director
FRANK T. SHEETS,
Chief Highway Engineer

[Reprinted from the Seventh Administrative Report. Printed by authority of the State of Illinois.]

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Illinois State Journal Co
Springfield, Ill.
1925

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DIVISION OF HIGHWAYS.

Frank T. Sheets, *Chief Highway Engineer.*

Illinois surpassed its own record breaking accomplishments of the year 1923 by building during 1924 a total of 1,230 miles of durable hard surfaced roads, of which 1,018 miles are located on the State bond issue system.

This performance was made possible by letting contracts in the fall of 1923 and the early months of 1924, thus enabling contractors to set up their plants and store materials in preparation for the construction season. Every available construction day was utilized for actual paving operations. Cement, sand, gravel, and stone were stored during the spring months so that no trouble from material shortages, car shortages, or similar untoward conditions was encountered.

During the season, 183 large paving mixers, 11,750 men, and 3,000 teams were operating throughout all parts of the State. Construction attained a maximum rate of 63 miles per week or approximately one mile per working hour. A new world's record of 2,669 feet of 18-foot pavement was laid with one paving mixer in one day.

These facts serve to drive home to the people of Illinois the realization that each year the highway transportation facilities of our commonwealth are being substantially enlarged, and that Illinois is literally being lifted out of the mud.

In Figure 3 there is shown the mileage of pavements laid per year from 1914 to 1924, inclusive. A sharp contrast may be noted in the accomplishments of the years 1921 to 1924, inclusive, as compared with the previous years. The total mileage built during the entire eleven years amounts to 4,671 miles, of which 75 per cent has been completed during the past four years, or, to state the situation in another manner, the mileage built during the first administration of Governor Len Small is almost three times the mileage completed during the preceding seven years. This may be visualized by a comparison of Figures 1 and 2, which show the highway development of Illinois as of January 1, 1921 and as of December 31, 1924.

Another important accomplishment of the division has been the perfecting of the highway marking system established during 1923. The details of the improved system are described in another part of this report.

Continuing the policies of past years, all of the completed highways have been carefully maintained. The patrol system of maintenance has proved to be entirely practical. Every effort has been made to keep the highways in a neat, presentable, and safe condition, and to safe-guard our highway investment by thorough and adequate maintenance. Also the corps of State highway partol officers created under the provisions of the Motor Vehicle Act has been very effiicient in the

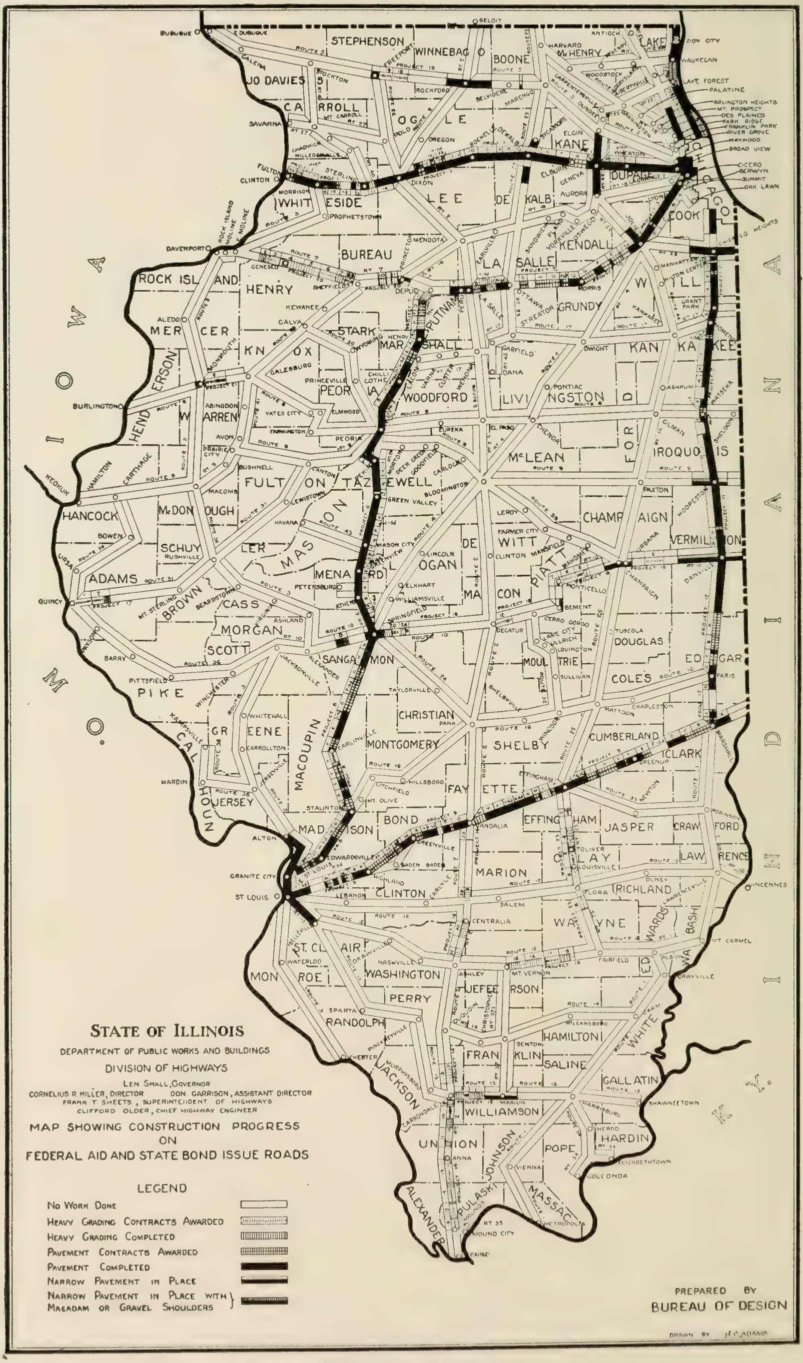


Figure 1.—As Illinois looked January 1, 1921.

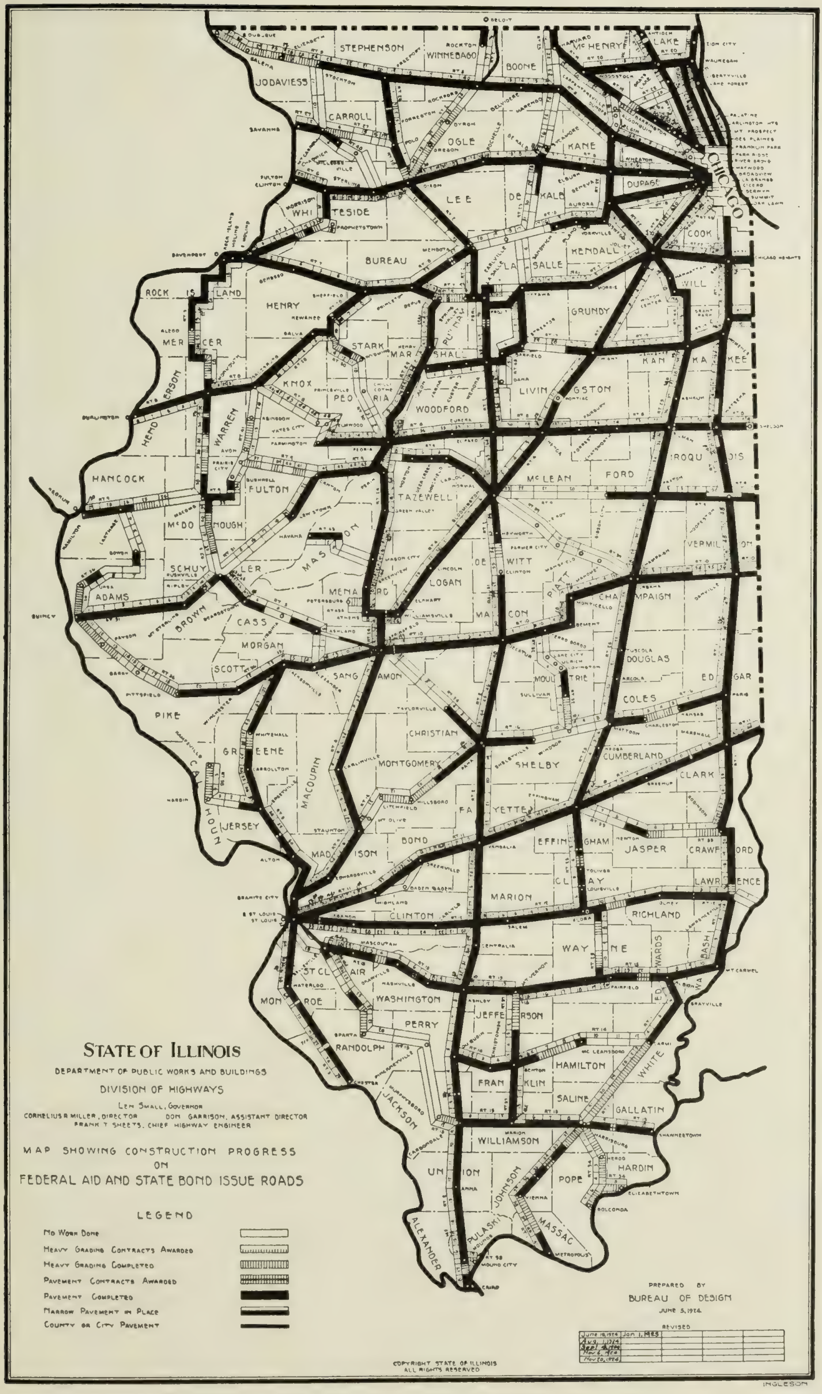


Figure 2.—As Illinois looked December 31, 1924.

control of traffic, and especially in the regulation of the weight of trucks. By this means, the overloaded truck, which is one of the greatest menaces to the modern highway, has been practically eliminated. The Bates road test shows conclusively that the highways as they are now built in Illinois are entirely safe for the present legal limit of load, which consists of a truck weighing not to exceed 24,000 pounds and an axle load of not to exceed 16,000 pounds with the tires on the wheels so arranged that the load shall not exceed 800 pounds per inch of width of tread in contact with the road surface.

The rapid progress which has been made in highway construction has necessitated the expenditure of highway funds at a very rapid rate. It became evident in 1922 that unless further means of financing were provided, the highway program of Illinois would have to be seriously curtailed. This led Governor Small to recommend to the Fifty-third General Assembly that a law be passed permitting the people of Illinois to vote at the general election in November, 1924, on the proposition of issuing $100,000,000 of additional State highway bonds, principal and interest to be paid by motor license fees without direct taxation, for the purpose of completing the original $60,000,000 State bond issue system and enlarging it by adding about 3,000 miles.

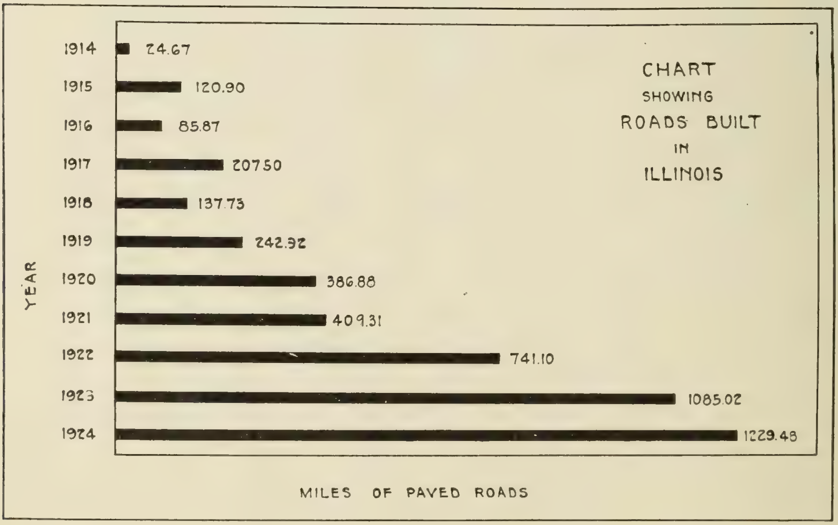


Figure 3.

This recommendation was received very favorably by the General Assembly. A carefully thought out system of highways was developed, and the law passed, but the General Assembly in its wisdom provided for about 5,100 miles of new roads. The proposition was voted on by the people at the November, 1924, election, and approved by an overwhelming majority, thereby providing the necessary funds to proceed with highway construction.

The $100,000,000 Bond Issue Road Act provides that, unless engineering difficulties prohibit, contracts shall first be let for the complete construction of the $60,000,000 bond issue system before any work is undertaken on the new system. Immediately following the approval of the act by the people, the Department began letting contracts, so that this provision of the law could be complied with at the earliest possible date. It is expected that contracts for the completion of the the entire $60,000,000 bond issue system can be let during the year 1925, so as to permit starting work on the new routes.

In the following pages will be found a detailed report of the various bureaus of this division. Because the work of this division naturally arranges itself by calendar years, all statistical information is based on the calendar year of 1924.

BUREAU OF DESIGN.

SURVEYS AND PLANS.

With a few exceptions, all surveys for the various routes on the original $60,000,000 bond issue road system were completed by the end of 1924. There was a relatively small mileage on which locations had not been definitely determined, but such portions will probably be surveyed during 1925.

The preparation of plans follows very closely the completion of surveys and, as a result, very little plan work on the $60,000,000 system remains to be done during 1925.

CONTRACTS AWARDED.

Table I and Table II show the contracts for road work which have been awarded directly by the State from 1914 to 1924, inclusive, on the Federal aid, State bond issue, and State aid systems.

TABLE NO. I—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per Mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1918						8.36	$ 201,619.40	$24,131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401.77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47,57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1,488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5,818.01	83	901,884.69	472.05	12,634,976·84	26,766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23,123,159.60	26,617.20
1924	163.93	2,013,223.70	12,280.99	84	1,070,387.21	503.54	13,597,135.32	27,003.09
Total	1,023.90	$10,199,246.74	$9,961.17	663	$7,953,048.94	2,997.67	$84,768,820.00	$28,278.24

NOTE.—Grading and bridge work shown does not necessarily coincide with the pavement shown. No Federal aid or State bond issue contracts were awarded previous to 1918.

TABLE NO. II—STRAIGHT STATE AID CONTRACTS AWARDED.

Year.	Earth roads.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1914	--------	--------------	----------	7	$ 815.00	91.61	$ 963,216.54	$10,514.32
1915	1.75	$ 21,643.58	$12,367.76	308	178,708.65	74.65	738,623.55	9,824.49
1916	186.11	401,613.65	2,157.94	90	62,953.19	97.34	1,212,655.01	12,457.93
1917	181.13	412,056.55	2,274.92	90	77,281.66	90.57	1,333,000.12	14,717.90
1918	--------	--------------	----------	5	44,288.00	2.75	73,708.35	26,803.08
1919	71.10	262,394.20	3,690.50	36	51,588.00	52.08	1,136,920.79	21,830.28
1920	2.76	29,571.32	10,714.25	5	11,890.00	3.48	99,793.61	28,676.32
1921	2.22	9,981.22	4,496.05	19	22,130.33	2.76	46,104.45	16,704.51
1922	.27	3,334.65	12,350.56	5	2,705.00	2.98	49,264.70	16,531.78
1923	--------	--------------	----------	------	--------------	----------	--------------	----------
1924	--------	--------------	----------	------	--------------	----------	--------------	----------
Total	445.34	$1,140,595.17	$2,561.18	565	$452,359.83	418.22	$5,653,287.12	$13,517.50

NOTE.—Table shows total cost; one-half of this cost was paid by county and one-half by State. Pavement includes all types and widths.

Section 15d of the Road and Bridge Laws provides that any county may improve its State aid roads more rapidly than its allotments of State aid funds will permit, advancing the entire cost of construction from county funds. In such event, the county may use any future allotment of State aid moneys on the payment of bonds or other obligations it has incurred in the construction of such roads, or to defray one-half the cost of improving further State aid roads.

Plans, specifications, estimates, and contracts for all 15d work must be approved by the Department of Public Works and Buildings, which also supervises the construction and, when the improvement is completed and accepted, bears the same share of the maintenance cost that it would, had the work been done as a straight State aid proposition.

Table III shows the amount of 15d work placed under contract in the State as a whole from 1914 to 1924, inclusive, while Table IV shows the amount of 15d work placed under contract by the various counties during 1924.

TABLE NO. III—15D CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1916	--------	--------------	----------	------	--------------	174.58	$2,204,680.94	$12,628.49
1917	25.93	$ 60,658.01	$ 2,339.30	16	$ 5,065.00	37.34	$ 745,962.28	19,977.56
1918	11.00	45,609.17	4,146.29	21	44,179.64	10.84	270,480.54	24,952.08
1919	42,58	167,425.56	3,932.02	25	40,680.00	153.94	4,391,177.96	28,525.26
1920	13.07	104.533.72	7,997.98	10	185,494.87	44.06	1,626,373.67	36,912.70
1921	17.57	100,154.52	5,700.31	4	61,746.82	58.09	1,311,946.53	22,584.72
1922	15.23	102,085.56	6,702.92	87	359,743.96	258.34	5,637,805.33	21,823.20
1923	15.32	168,804.06	11,018.54	22	620,366.61	187.41	3,433,764.03	18,322.20
1924	21.38	221,007.97	10,337.14	65	329,099.57	174.15	3,528,734.26	20,262.61
Total	162.08	$970,278.57	$5,986.41	250	$1,646,376.47	1,098.75	$23,150,925.54	$21,070.23

TABLE IV—CONTRACTS AWARDED FOR COUNTY 15D WORK, 1924.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Bond					0.379	$ 6,185.57	$ 6,185.57
Boone					0.379	4,511.00	4,511.00
Bureau					19.322	84,499.35	84,499.35
Carroll					0.952	6,149.48	6,149.48
Champaign	1.820	$ 26,626.35	33	$95,269.21	55.950	1,003,021.73	1,124,917.29
Cook	10.732	123,979.85	15	62,851.19	11.630	382,987.43	569,818.47
DeKalb					2.285	68,323.83	68,323.83
Douglas					3.130	80,452.38	80,452.38
DuPage			2	34,848.00	17.566	368,228.43	403,076.43
Iroquois					6.777	134,868.71	134,868.71
Jasper			1	25,477.50			25,477.50
Kane			2	13,808.48	19.778	563,237.46	577,045.94
Kankakee					1.945	31,798.25	31,798.25
Lake					7.900	231,949.00	231,949.00
Livingston			6	8,540.95			8,540.95
Macoupin					3.321	46,619.00	46,619.00
Peoria					1.098	29,995.79	29,995.79
Piatt					4.999	87,597.26	87,597.26
Rock Island					2,165	51,449.20	51,449.20
St. Clair	7.938	37,569.07	3	4,582.48	5.058	158,393.31	200,544.86
Stephenson					1.544	11,809.97	11,809.97
Vermilion	0.890	32,832.70	2	37,753.57			70,586.27
Will					4.050	56,738.26	56,738.26
Winnebago			1	45,968.19	3.924	119,918.85	165,887.04
Total	21.38	$221,007.97	65	$329,099.57	174.152	$3,528,734.26	$4,078,841.80

PAVEMENT CROSS SECTIONS.

During 1924, very little change was made in the thickened edge pavement cross section used in 1923. Such changes as were made in the Portland cement concrete section were, for the most part, minor refinements to improve construction methods, rather than revisions of design. Some modification has been made in the bituminous filled brick pavement section; while the monolithic brick section was discontinued as a standard type after November 1, 1924.

The various pavement cross sections used during 1924 are shown in Figures 4 and 5.

UNIT PRICES.

In Figure 6 are graphs showing the range in unit costs for the principal items in highway construction during 1924. These graphs are based on actual contract prices. The dates at the bottom of the chart indicate the time bids were submitted, while the various points on the curves are plotted from weighted average unit prices.

Figue 7 shows the weighted average unit prices by years from 1919 to 1924, inclusive. It is interesting to note the great reductions which were affected in all unit prices in 1921, with still further decreases in 1922. The slight increase in cost of some items shown in 1923 and 1924 is accounted for largely by higher labor rates.

In both Figures 6 and 7, unit prices for pavement and for concrete do not include cement, which is furnished the contractor by the State.

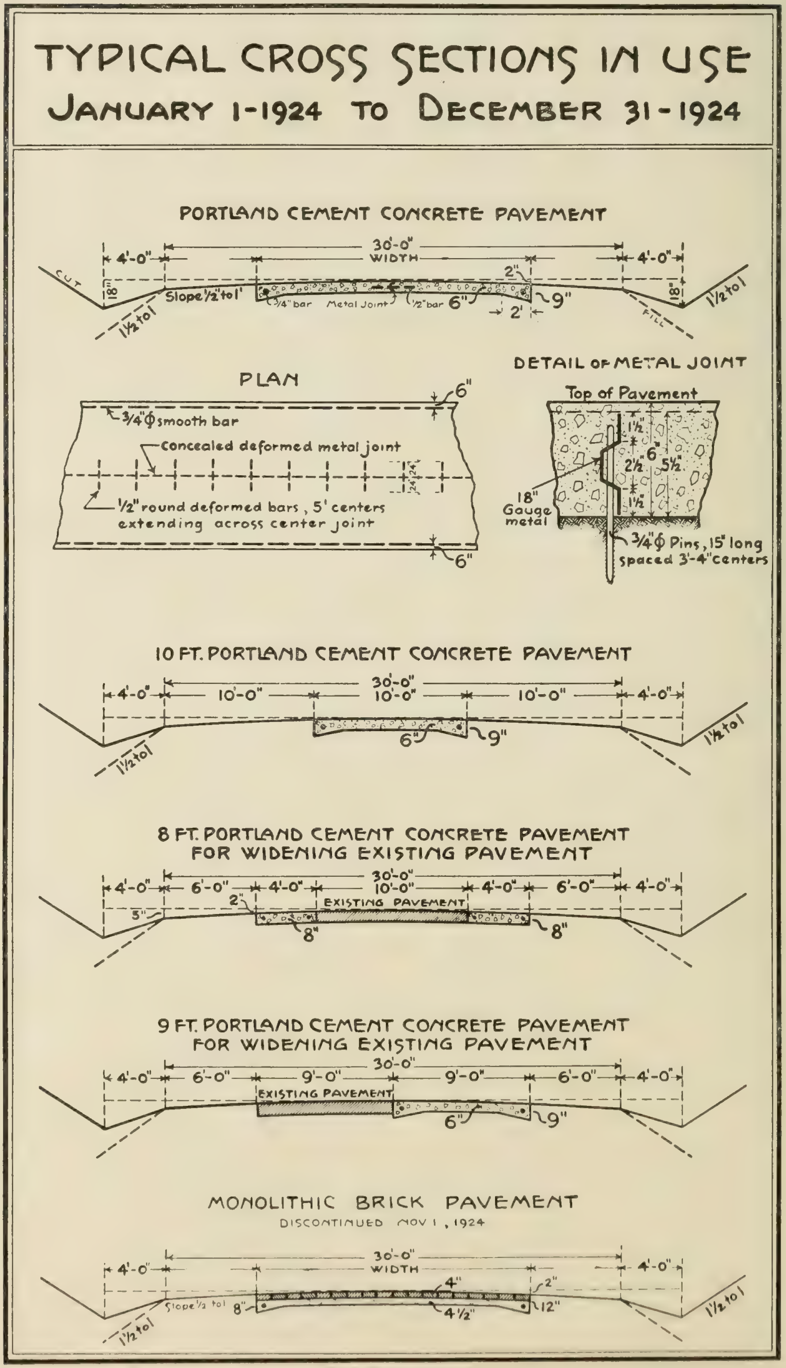
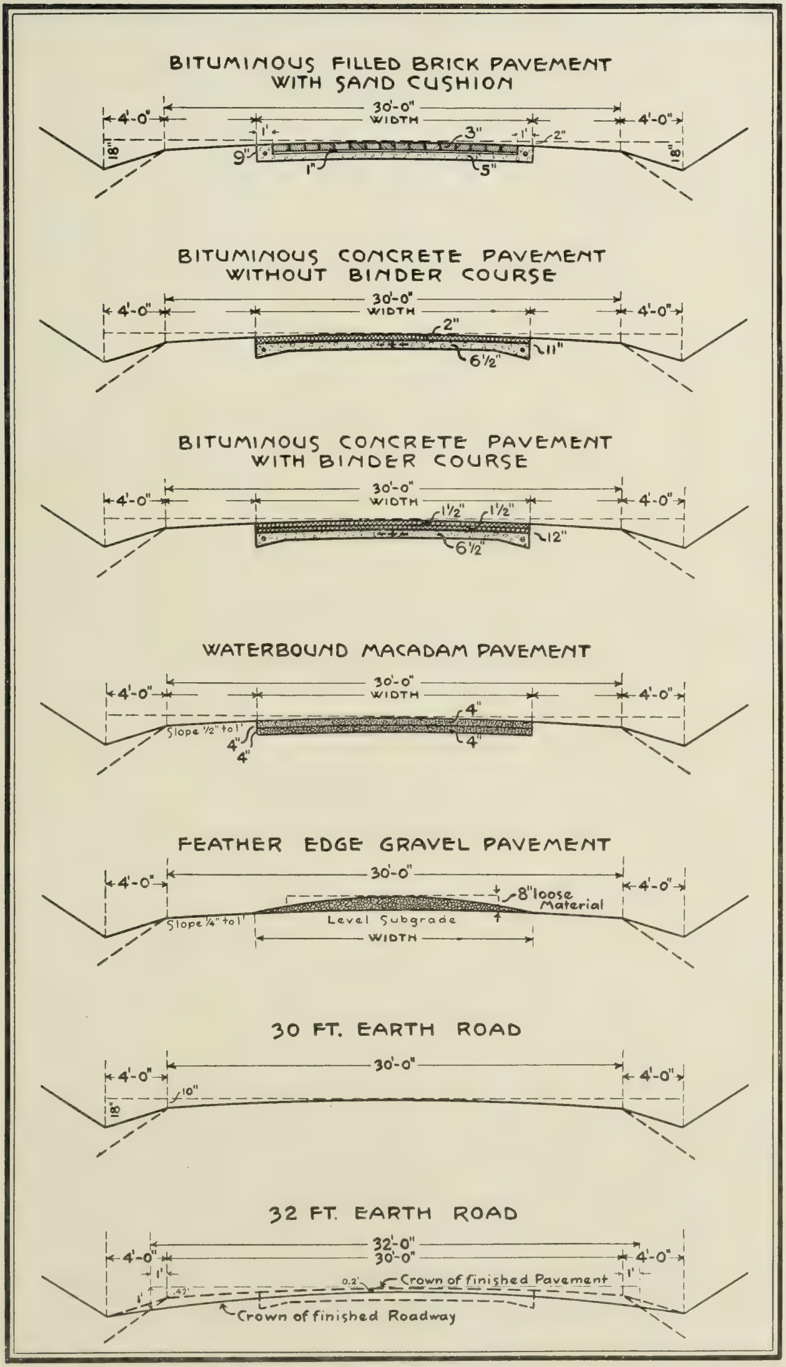

TYPICAL CROSS SECTIONS IN USE
JANUARY 1-1924 TO DECEMBER 31-1924
PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
WIDTH
4'-0"
4'-0"
CUT
FILL
18"
Slope ½" to 1'
1½ to 1
2"
¾" bar
Metal Joint
½" bar
6"
9"
2'
PLAN
6"
¾" ϕ smooth bar
Concealed deformed metal joint
½" round deformed bars, 5' centers extending across center joint
DETAIL OF METAL JOINT
Top of Pavement
1½"
6"
2½"
5½"
1½"
18" Gauge metal
¾" ϕ Pins, 15" long spaced 3'-4" centers
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
4'-0"
10'-0"
10'-0"
10'-0"
4'-0"
6"
9"
1½ to 1
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
4'-0"
10'-0"
4'-0"
6'-0"
4'-0"
2"
5"
EXISTING PAVEMENT
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
9'-0"
9'-0"
6'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
MONOLITHIC BRICK PAVEMENT
DISCONTINUED NOV 1, 1924
30'-0"
WIDTH
4'-0"
4'-0"
4"
2"
Slope ½ to 1
8"
4½"
12"
1½ to 1

Figure 4.



BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION

BITUMINOUS CONCRETE PAVEMENT WITHOUT BINDER COURSE

BITUMINOUS CONCRETE PAVEMENT WITH BINDER COURSE

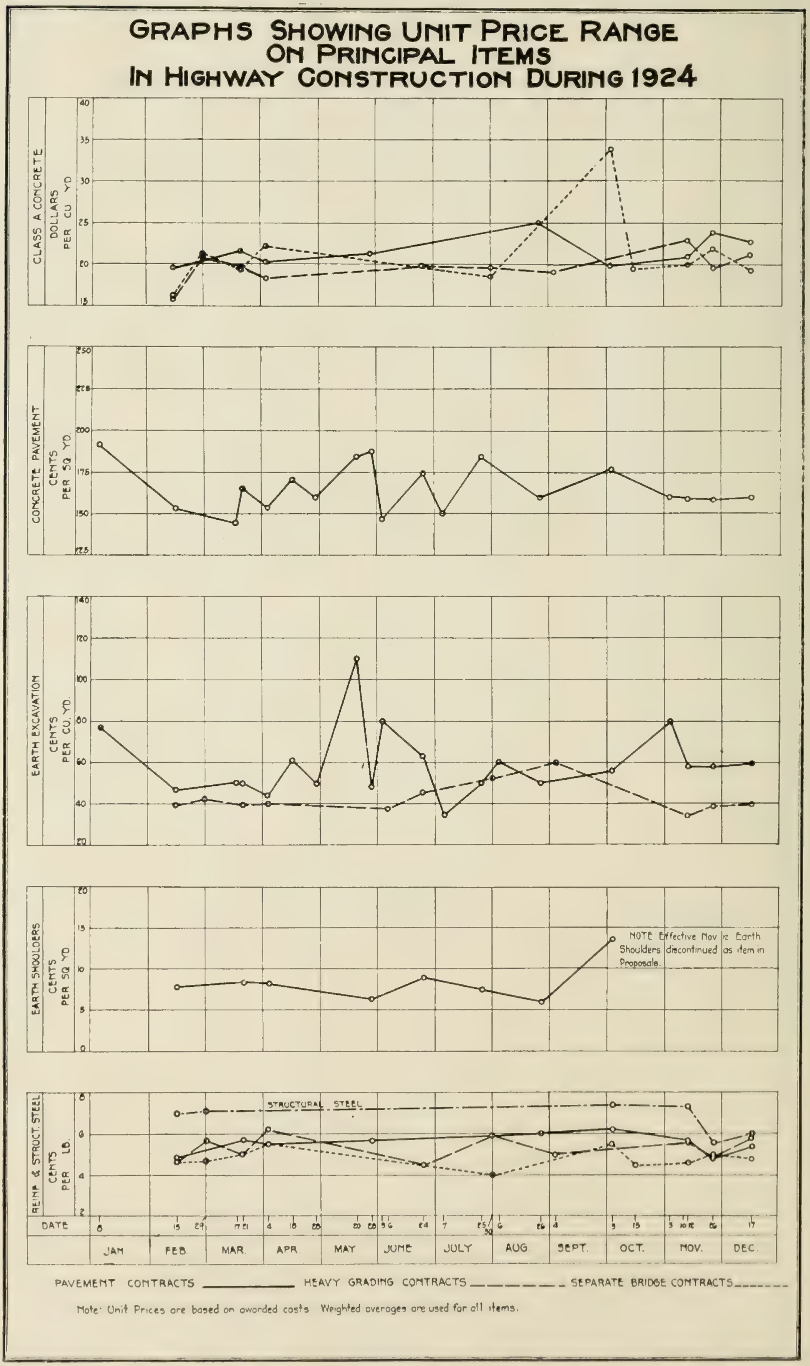
WATERBOUND MACADAM PAVEMENT

FEATHER EDGE GRAVEL PAVEMENT

30 FT. EARTH ROAD

32 FT. EARTH ROAD

Figure 5.

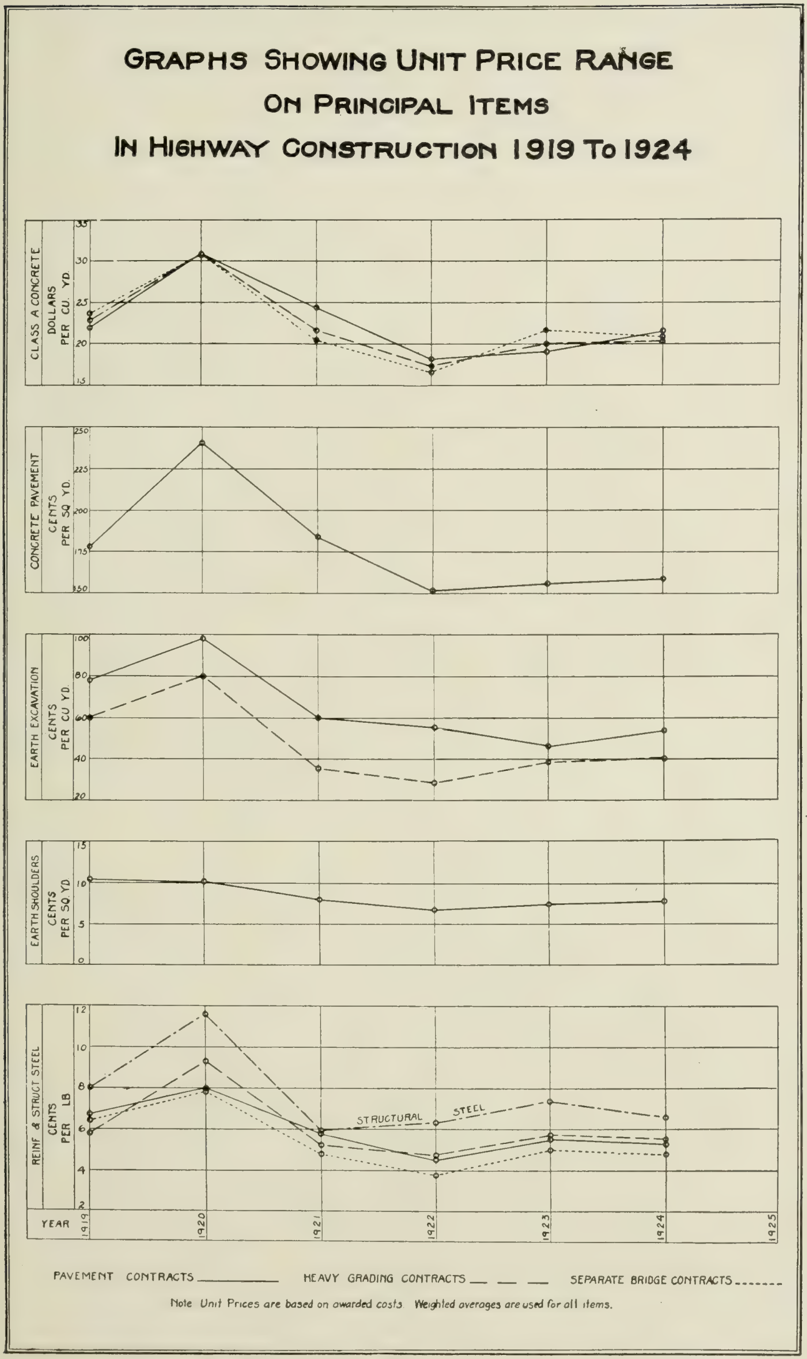

GRAPHS SHOWING UNIT PRICE RANGE ON PRINCIPAL ITEMS IN HIGHWAY CONSTRUCTION DURING 1924

NOTE Effective Nov 12 Earth Shoulders discontinued as item in Proposals.

PAVEMENT CONTRACTS ———— HEAVY GRADING CONTRACTS — — — — SEPARATE BRIDGE CONTRACTS - - - - - -

Note: Unit Prices are based on awarded costs Weighted averages are used for all items.

Figure 6.



GRAPHS SHOWING UNIT PRICE RANGE
ON PRINCIPAL ITEMS
IN HIGHWAY CONSTRUCTION 1919 TO 1924

PAVEMENT CONTRACTS ———— HEAVY GRADING CONTRACTS — — — SEPARATE BRIDGE CONTRACTS ------

Note Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 7.

FEDERAL AID.

Table V shows all Federal aid allotments which have been made to the State of Illinois.

TABLE V—FEDERAL AID ALLOTMENTS.

Fiscal year ending June 30.	Fund.	Amount allotted to Illinois.	Subtotal.
1917	$ 75,000,000.00	$ 220,926.23	
1918		441,852.46	
1919		658,323.48	
1920		874,220.26	
1921		1,091,266.98	
			$3,286,589 41
1919	200,000,000.00	$2,185,550.65	
1920		3,278,325.97	
1921		3,273,800.93	
			8,737,677.55
1922	75,000,000.00	3,246,281.07	
			3,246,281.07
1923	50,000,000.00	2,164,187.38	
1924	65,000,000.00	2,797,888.59	
1925	75,000,000.00	3,203,867.99	
			8,165,943.96
Total Federal aid allotments to Illinois			$23,436,491.99

The status of Federal aid funds on January 1, 1925, is shown in Table VI.

As this table indicates, there are four distinct stages in Federal aid procedure, namely; Project Statement, Project Agreement Estimate, Project Agreement, Completed Work. Funds are first obligated through approval by the Federal Government of a Project Statement submitted by the State, and consisting of a description of the proposed improvement, and a preliminary estimate of the total cost and the proportion to be paid by the Federal Government. When a contract covering the proposed work has been awarded, a Project Agreement Estimate, based on actual contract quantities and prices, is submitted to the Federal Government, and on approval, the Federal share of the cost is considered in the Project Agreement Estimate stage. A Project Agreement, which is the contract between the Federal and State officials regarding the manner in which the improvement is to be made and the percentage of cost to be borne by the Federal and State Governments, respectively, is then executed, and the funds are transferred to this stage. After the work is completed, reimbursements are received from the Federal Government for its share of the cost of such completed work.

The last column in the following table, therefore, shows the total amount of Federal aid funds which have been received, and the sum of the amounts requested in the Project Statement, Project Agreement Estimate, and Project Agreement stages is the approximate total Federal aid to be paid on outstanding projects.

TABLE VI—STATUS OF FEDERAL AID FUNDS.

January 1, 1925.

Project No.	S. B. I. Route No.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
1-23		760.590			$203,833.29	$23,249.39	$117,971.46	$ 25,656.60	$26,475,615.64	$12,028,827.44	$11,995,983.20
24	21	14.154					29,862.10	14,931.04	366,605.31	183,302.81	183,302.81
25	4	11.385							289,580.75	129,104.04	62,639.50
26	4	47.561							1,354,760.72	671,122.73	628,667.80
27	8	8.418							219,538.77	107,985.38	105,560.95
28	8	5.003							157,836.35	78,918.17	78,918.17
29	25	15.624							418,767.23	208,138.81	173,087.59
30	44	13.321							380,157.57	187,317.24	164,672.03
31	31	6.544							199,555.79	93,295.06	39,520.06
32	15	12.730					39,288.73	19,644.36	277,602.12	138,801.05	138,801.05
33	9	8.163					94,306.92	41,351.53	212,156.44	101,425.00	99,698.14
34	12	8.675							297,777.81	145,301.79	118,163.74
35	12	7.590							190,697.38	95,065.91	95,065.91
36	2	10.245							257,466.04	127,894.86	124,688.71
37	12	0.580							87,353.17	42,225.61	42,225.61
38	3	12.232							415,985.84	199,203.12	199,203.12
39	27	7.732					7,320.24	3,660.12	262,419.56	127,478.80	77,625.23
40	9	12.105							336,996.34	164,461.23	164,461.23
41	5	5.033							133,696.57	66,848.28	66,848.28
42	1	6.316							230,194.23	111,691.52	111,691.52
43			Project withdrawn								
44	24	6.628							185,294.24	91,481.84	66,629.90
45	36	6.044							188,943.39	91,275.82	91,275.82
46	3	13.896	$117,358.68	$58,679.34					239,456.10	119,728.05	116,463.66
47	3	10.130					21,944.98	10,972.49	240,284.96	120,142.48	120,142.48
48	8	13.531					7,831.48	3,915.73	397,187.87	196,744.94	192,100.12
49	17	28.583			43,909.01	21,954.50	269,609.30	134,804.64	434,431.24	217,215.62	202,378.34
50	25	14.009							338,567.92	169,283.95	160,706.89
51	9	4.649							116,072.29	56,793.71	56,793.71
52	1	4.069							103,572.93	50,752.40	50,752.40
53	1	4.926							163,768.74	80,047.50	80,047.50
54	2	5.931							135,620.97	67,661.62	67,661.62
55	7 & 29	8.460			46,987.99	16,843.94	41,722.78	6,429.77	246,427.29	119,413.08	119,413.08
56	9	20.213					15,924.22	7,962.11	518,348.55	259,173.06	151,088.12
57	13	6.056							177,368.98	88,684.49	88,684.49

TABLE VI—Concluded.

Project No.	S. B. I. Route No.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
58	16	5.116					$ 5,829.92	$ 2,914.96	$142,415.86	$ 71,207.93	$ 71,207.93
59	18 & 22	19.193	$36,473.51	$18,236.75			47,970.45	23,985.22	462,858.25	231,429.12	231,429.12
60	20	4.267							124,066.02	61,638.46	58,221.92
61	25	23.472					30,292.71	15,146.35	561,913.20	280,956.59	251,545.98
62			Project withdrawn								
63	28	9.336					14,717.54	7,358.76	220,487.96	110,243.98	110,243.98
64	30	3.700							105,983.47	52,991.73	52,991.73
65	31	5.449					35,899.60	17,949.80	116,196.58	58,098.29	58,098.29
66	32	7.952							201,436.96	100,718.48	100,718.48
67	42	3.525					104,559.11	52,279.55			
68	44	3.057							124,691.42	59,924.13	59,924.13
69	17	0.132					67,247.64	33,623.82	107,794.17	53,897.08	53,897.08
70	12	6.603							212,872.92	103,921.95	92,989.69
71	14	6.492					26,068.36	10,928.18	173,903.64	86,451.82	86,451.82
72	43	10.114					2,900.64	399.13	283,856.32	141,928.16	139,896.03
73	25	7.320							173,745.89	85,082.06	85,082.06
74	26	5.622							163,136.56	81,568.28	81,568.28
75	19 & 23	18.089							513,755.37	254,634.32	239,933.56
76	3	13.020							354,472.66	176,559.42	171,783.32
77	2	18.071					328,738.35	164,369.17	160,955.83	80,477.91	64,584.65
78	8	7.296					123,314.01	61,657.00	67,689.78	33,844.89	33,844.89
79	31	5.438					150,124.27	75,062.13			
80	12	6.995							175,369.99	87,684.99	82,435.00
81	2	25.159					162,198.10	81,099.04	523,044.28	261,522.14	217,929.14
82	18	22.140					137,230.44	68,615.22	465,017.62	232,508.81	181,461.17
83	19	7.477							205,492.01	101,178.03	96,346.51
84	8	21.430					90,736.90	45,368.44	498,980.46	249,490.23	236,668.88
85			Project withdrawn								
86			No project								
87	3	4.348			$142,439.61	$65,220.00					
88	18	13.995	403,520.00	201,760.00							
89	3	12.048	153,570.00	76,785.00	249,807.39	124,903.69					
90	3	7.649			218,353.28	109,176.64					
91	31	3.303			110,920.20	49,545.00					
92	3	13.274			373,810.90	186,905.44					

93	3	20.749	240,270.18	120,135.09	337,906.30	168,850.71					
94	22	5.076	155,910.00	77,955.00							
95	23	20.247	86,046.00	43,023.00	527,104.00	263,551.99					
96	13	21.353	21,600.00	10,800.00	583,149.51	284,692.49					
97	9	30.212			855,671.07	427,835.53					
98	16	12.859			342,901.07	171,450.53					
99	9	19.082			505,636.56	252,818.27					
100			No project								
101		2.015			71,203.85	35,282.00					
	Total...	1,573.801	$1,214,748.37	$607,374.18	$4,613,634.03	$2,202,280.12	$1,973,610.25	$930,085.16	$42,190,246.32	$19,794,766.21	$19,094,216.42

STATE AID.

The Road and Bridge Laws provide that all parts of the State aid road system not taken over by the Department of Public Works and Buildings shall be under the jurisdiction and control of the various county boards. Further, a county highway tax is provided to furnish funds for the maintenance of State aid roads.

The various counties are constantly making revisions or additions to their State aid systems, in order that county maintenance may be had on their more important roads. Before any change may be made in the State aid system of any county, the proposed change must be approved by the Department of Public Works and Buildings. The various investigations and reports which must be made in connection with proposed changes are handled by the Bureau of Design, which also keeps records of the State aid mileage in each of the counties.

The status of State aid mileage in the various counties is shown in Table VII.

TABLE VII—STATUS OF STATE AID MILEAGE.

County.	Class.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
Adams	2	1,538.00	384.50	305.40	79.10
Alexander	1	427.00	85.40	65.75	19.65
Bond	1	655.00	131.00	129.64	1.36
Boone	1	492.00	98.40	91.40	7.00
Brown	1	513.00	102.60	79.80	22.80
Bureau	2	1,481.00	370.25	299.10	71.15
Calhoun	1	317.80	63.56	51.10	12.46
Carroll	1	748.00	149.60	116.30	33.30
Cass	1	570.00	114.00	81.37	32.63
Champaign	2	1,910.00	477.50	380.33	97.17
Christian	2	1,269.00	317.25	260.30	56.95
Clark	1	994.00	198.80	183.30	15.50
Clay	1	842.00	168.40	128.10	40.30
Clinton	1	704.00	140.80	100.10	40.70
Coles	2	968.00	242.00	180.60	61.40
Cook	3	1,503.50	451.05	460.02	----------------
Crawford	1	821.00	164.20	129.80	34.40
Cumberland	1	687.00	137.40	94.30	43.10
DeKalb	2	1,089.00	272.25	236.05	36.20
DeWitt	1	732.00	146.40	117.15	29.25
Douglas	1	790.00	158.00	99.90	58.10
DuPage	2	776.00	194.00	155.25	38.75
Edgar	2	1,105.00	276.25	267.28	8.97
Edwards	1	414.00	82.80	52.70	30.10
Effingham	1	956.00	191.20	140.40	50.80
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	132.60	37.00
Franklin	1	648.00	129.60	120.95	8.65
Fulton	2	1,488.00	372.00	311.55	60.45
Gallatin	1	440.00	88.00	64.50	23.50
Greene	1	805.00	161.00	150.50	10.50
Grundy	1	756.75	151.35	147.60	3.75
Hamilton	1	817.00	163.40	132.75	30.65
Hancock	2	1,452.00	363.00	245.05	117.95
Hardin	1	245.00	49.00	37.50	11.50
Henderson	1	595.00	119.00	101.40	17.60
Henry	2	1,401 00	350.25	272.00	78.25
Iroquois	2	2,108.00	527.00	424.85	102.15
Jackson	2	977.00	244.25	201.55	42.70
Jasper	1	960.00	192.00	142.25	49.75
Jefferson	2	1,100.00	275.00	178.10	96.90
Jersey	1	572.00	114.40	91.60	22.80
JoDaviess	2	883.00	220.75	197.65	23.10
Johnson	1	432.00	86.40	83.30	3.10
Kane	2	836.00	209.00	176.00	33.00
Kankakee	2	1,300.00	325.00	240.37	84.63

TABLE VII—Concluded.

County.	Class.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
Kendall	1	508.00	101.60	81.00	20.60
Knox	2	1,308.85	327.21	328.12	----------
Lake	2	776.00	194.00	184.99	9.01
LaSalle	2	2,006.00	501.50	382.03	119.47
Lawrence	1	662.00	132.40	112.65	19.75
Lee	2	1,229.00	307.25	305.10	2.15
Livingston	2	2,029.00	507.25	377.00	130.25
Logan	2	957.00	239.25	195.85	43.40
McDonough	2	1,094.00	273.50	222.10	51.40
McHenry	2	993.00	248.25	239.25	9.00
McLean	2	2,080.00	520.00	457.40	62.60
Macon	2	1,027.00	256.75	208.10	48.65
Macoupin	2	1,427.00	356.75	282.07	74.68
Madison	2	1,169.00	292.25	232.40	59.85
Marion	2	1,138.00	284.50	224.05	60.45
Marshall	1	618.00	123.60	121.02	2.58
Mason	1	798.00	159.60	115.30	44.30
Massac	1	368.00	73.60	59.05	14.55
Menard	1	506.00	101.20	80.60	20.60
Mercer	1	911.00	182.20	142.50	39.70
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1,258.00	314.50	251.40	63.10
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	97.20	26.40
Ogle	2	1,330.00	332.50	332.00	.50
Peoria	2	1,099.75	274.93	256.65	18.28
Perry	1	706.00	141.20	111.75	29.45
Piatt	1	764.00	152.80	133.50	19.30
Pike	2	1,542.00	385.50	285.75	99.75
Pope	1	559.30	111.86	96.95	14.91
Pulaski	1	334.50	66.90	47.45	19.45
Putnam	1	270.00	54.00	45.45	8.55
Randolph	2	886.00	221.50	171.25	50.25
Richland	1	809.00	161.80	120.90	40.90
Rock Island	2	688.00	172.00	142.40	29.60
St. Clair	2	1,279.00	319.75	287.20	32.55
Saline	1	609.00	121.80	89.80	32.00
Sangamon	2	1,401.00	350.25	237.95	112.30
Schuyler	1	735.00	147.00	114.35	32.65
Scott	1	363.00	72.60	52.30	20.30
Shelby	2	1,495.00	373.75	290.10	83.65
Stark	1	531.00	106.20	112.05	----------
Stephenson	2	1,077.00	269.25	208.80	60.45
Tazewell	2	1,010.00	252.50	213.50	39.00
Union	1	626.00	125.20	120.80	4.40
Vermilion	2	1,558.00	389.50	324.05	65.45
Wabash	1	380.00	76.00	57.90	18.10
Warren	1	990.00	198.00	184.20	13.80
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	211.05	65.15
White	2	992.00	248.00	225.18	22.82
Whiteside	2	1,130.00	282.50	251.75	30.75
Will	2	1,611.00	402.75	347.75	55.00
Williamson	2	827.00	206.75	155.05	51.70
Winnebago	2	1,025.53	256.38	250.20	6.18
Woodford	1	941.00	188.20	165.35	22.85
Total	-------	96,996.98	22,615.64	18,660.17	3,971.20

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

Class.	Number of counties.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
1	52	34,175.35	6,835.07	5,571.98	1,268.94
2	49	61,318.13	15,329.52	12,628.17	2,702.26
3	1	1,503.50	451.05	460.02	----------
Total	102	96,996.98	22,615.64	18,660.17	3,971.20

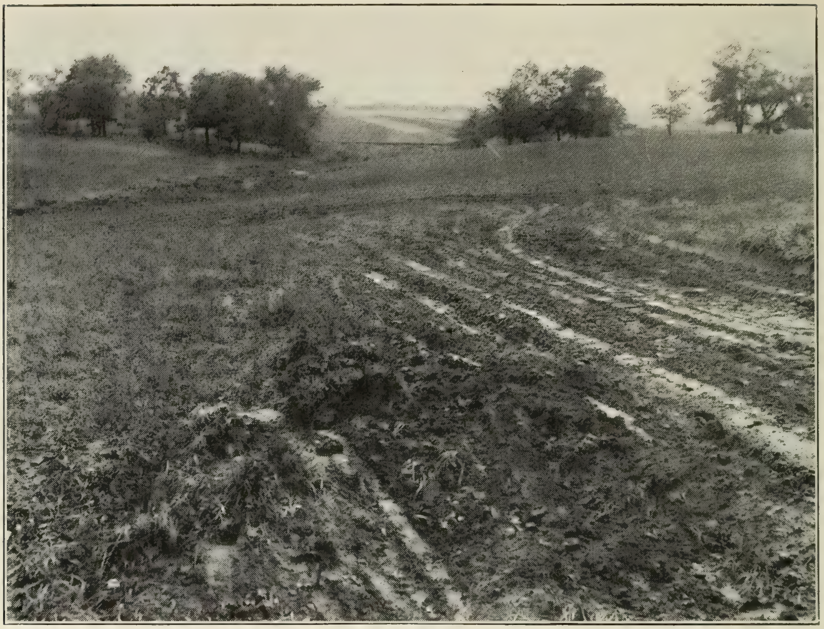


Figure 8.—Before Construction: Site of Subway under Illinois Central Railroad 1 mile south of Decatur. Route 2, Section 48.

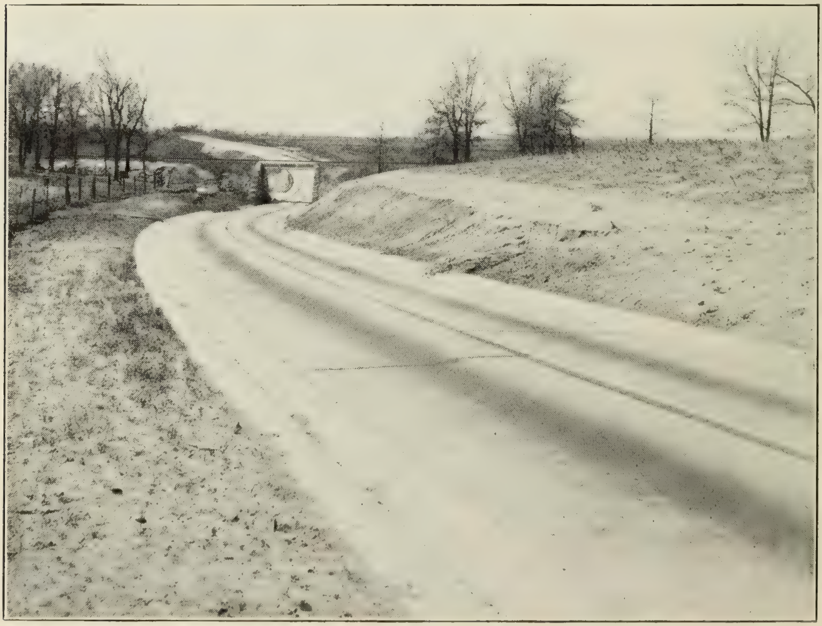


Figure 9.—After Construction: Subway under Illinois Central Railroad 1 mile south of Decatur. Route 2, Section 48.

GRADE SEPARATIONS.

In the building of bond issue roads the Department, at all times, attempts to avoid railroad grade crossings. Where advisable, grade crossings are eliminated by relocating the highways so as to remove the necessity of crossing railroads. Where it is necessary to cross a railroad, an attempt is made to separate grades between the highway and the railway by means of a viaduct or a subway. In some cases, it is physically impossible to avoid grade crossings and, in such instances, various means of crossing protection are employed. Often it is found advantageous to change the location of an existing grade crossing to a point which will afford greater safety.

The statutes of the State require that all matters pertaining to separation of grades, new grade crossings, or relocation of existing crossings, be taken before the Illinois Commerce Commission. A petition requesting the particular change desired is filed with this body, which then holds hearings to determine the advisability of the proposal. When all parties to the case have presented their testimony and arguments, the Commission issues an order reciting its decision, and in case the petition is granted, giving the various details of construction and the division of cost between the State and the railroad. The usual practice is to attempt to reach an agreement with the railroad as to the necessity of the proposed improvement, the construction details, and the division of cost, before taking a case before the Illinois Commerce Commission.

The preparation of plans and estimates, drawing up of petitions, carrying on negotiations with the railroad companies, representing the Department before the Illinois Commerce Commission, and all other activities relating to these cases are handled by the Bureau of Design. So important has this work become, that it is necessary to keep a special force of men exclusively engaged at it.

Table VIII shows the grade separation cases which had been settled to the end of 1924. In addition to these, there are a number of cases pending before the Commerce Commission, and numerous others for which negotiations are under way, but which have not yet been presented to the Commission.

TABLE VIII—GRADE SEPARATION CASE SETTLED

(January 1, 1919 to January 1, 1925.)

Location.				Railroad.	I. C. C. case number.	Type of crossing.	Petition filed.	Final hearing.	I. C. C. order issued.	Work Completed.
Rt.	Sec.	County.	Near.							
1	11	Will	Steger	C. & E. I	9264	Under	July 9, 1919	May 10, 1922	May 25, 1922	Aug. 1923
1	F-1	Clark	Marshall	Penn	10702	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Apr. 1923
1	F	Clark	Marshall	C., C., C. & St. L	11076	Under	Oct. 28, 1920	Nov. 3, 1921	Dec. 6, 1921	Feb. 1923
1	161	Cook	Homewood	I. C	13375	Under	June 25, 1923	July 19, 1923	Oct. 17, 1923	
2	14	Pulaski	Ullin	C. & E. I	12634	Under	Sept. 5, 1922	May 1, 1923	June 21, 1923	Nov. 1923
2	3	Jackson	DeSoto	M. P	12636	Under	Sept. 5, 1922	Feb. 6, 1923	Apr. 18, 1923	Dec. 1923
2	48	Macon	Decatur	I. C	13380	Under	June 26, 1923	May 22, 1924	May 14, 1924	Oct. 1924
3	67	Monroe	Columbia	M. & O	12637	Under	Sept. 5, 1922	Mar. 22, 1923	May 8, 1923	Dec. 1923
3	59	Jersey	McCluskey	C., P. & St. L	13847	Under	Jan. 30, 1924	May 8, 1924	May 14, 1924	Dec. 1924
4	M	Will	Joliet	E., J. & E	13923	Under	Feb. 26, 1924	Apr. 16, 1924	May 14, 1924	Aug. 1924
5	7	Cook	Spaulding	E., J. & E	12635	Over	Sept. 5, 1922	Oct. 25, 1922	Dec. 6, 1922	*
6	2	DuPage	West Chicago	E., J. & E	10887	Under	Aug. 13, 1920	Apr. 16, 1924	May 14, 1924	Dec. 1924
7	9	Bureau	Langley	C. & N. W	11705	Under	June 6, 1921	July 27, 1921	July 28, 1921	Feb. 1923
7	R	Bureau	DePue	N. Y. C	13666	Under	Nov. 13, 1923	July 31, 1924	Sept. 10, 1924	*
10	24	Morgan	Arnold	Wabash	11857	Under	Aug. 27, 1921	Nov. 23, 1922	Dec. 15, 1922	May 1923
10	21	Sangamon	Curran	C. & N. W	12460	Under	June 6, 1922	Oct. 18, 1922	Dec. 6, 1922	Dec. 1923
10	19X	Sangamon	Riverton	I. T., Inc	13511	Under	Sept. 8, 1923	Oct. 4, 1923	Oct. 24, 1923	*
11	29S	St. Clair	East St. Louis	B. & O., Penn	10291	Under	Mar. 1, 1920	June 29, 1921	Mar. 28, 1922	*
11	39	Madison	St. Jacob	Penn	10705	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Dec. 1923
11	Y	Fayette	Mulberry Grove	Penn	10704	Over	June 15, 1920	Nov. 3, 1921	Nov. 9, 1921	June 1922
11	L	Effingham	Effingham	Penn	10703	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Apr. 1923
14	9	Hamilton	McLeansboro	L. & N	12895	Under	Dec. 28, 1922	Oct. 23, 1923	Nov. 7, 1923	*
14	4	Franklin	Christopher	C., B. & Q	12857	Under	Dec. 11, 1922	May 7, 1924	July 9, 1924	Aug. 1924
19	86	Cook	DesPlaines	C. & N. W., Soo	12421	Under	July 11, 1922	Nov. 28, 1922	Apr. 25, 1923	*
22	42A	Cook	Matteson	I. C	12060	Under	Dec. 6, 1921	Jan. 24, 1922	Jan. 25, 1922	
26	1	Stephenson	South Freeport	C. G. W	13590	Under	Oct. 8, 1923	Oct. 18, 1923	Nov. 21, 1923	Nov. 1923
28	6	Knox	Wataga	C., B. & Q	13297	Under	May 31, 1923	May 7, 1924	July 9, 1924	Oct. 1924
28	11	Henry	Kewanee	C., B. & Q	13237	Under	May 11, 1923	May 7, 1924	July 9, 1924	Oct. 1924
29	M2	Peoria	Chillicothe	A., T. & S. F	9477	Under	Sept. 10, 1919		Apr. 28, 1920	Oct. 1921
31	3	Adams	Paloma	C., B. & Q	12459	Under	June 6, 1922	Mar. 6, 1923	Apr. 11, 1923	Sept. 1924
37	13	Williamson	Johnston City	I. C	12639	Over	Sept. 6, 1922	Oct. 4, 1923	Dec. 11, 1923	Dec. 1924
44	15	Kankakee	Bradley	I. C., N. Y. C	13591	Under	Oct. 8, 1923	June 6, 1924	Sept. 10, 1924	*

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* Work not completed.

REFUNDS TO COUNTIES.

Section 10 of the $60,000,000 Bond Issue Act provides that the various counties shall be reimbursed for their share of the costs of the various State aid paved roads incorporated in the State bond issue system. Both the Fifty-second and Fifty-third General Assemblies made appropriations for this purpose, and the information upon which the bills were based was compiled by the Bureau of Design. This Bureau also coordinates the work of the various Bureaus which is required in preparing the certificates showing the refunds due for each section utilized, and has charge of the records of the status of funds due each of the counties. During the latter part of 1924, it prepared, in anticipation of a new refund appropriation by the Fifty-fourth General Assembly, complete information upon which such appropriation might be based.

BRIDGES.

A large volume of bridge work was handled during 1924, both in plans prepared and contracts awarded. Engineering services were rendered to County Superintendents of Highways, as in preceding years. These services included surveys, investigations, preparation of plans and specifications, and assistance on construction work.

A brief description of several of the more important structures for which plans were prepared is listed below:

1. Blackhawk bridge in Cherry Valley Township, Winnebago County, over the Kishwaukee River. Seven reinforced concrete deck girder spans of 65 feet each. Estimate of cost, $53,640.00.
2. Washington Street bridge over the Rock River at Rockton, on State Bond Issue Route 2. Reinforced concrete open spandrel arches. Eight spans at 65 feet each. Partly supported on piling and partly on solid rock. Estimate of cost, $110,610.00.
3. Combination steel and concrete bridge over the Embarrass River at Lawrenceville, on Bond Issue Route 12. One steel span at 170 feet and twenty-five reinforced concrete deck girder spans at 50 feet each. Estimate of cost $123,930.00.
4. Cass Street viaduct over E. J. & E. Railroad at Joliet, on Bond Issue Route 22. Two steel plate girders encased in gunite, spans 60 and 75 feet, and eleven reinforced concrete deck girder spans of 35 feet each. Roadway, 36 feet, and two 6-foot sidewalks. Estimate of cost, $149,890.00.
5. Combination steel and concrete bridge over the Kaskaskia River at Evansville, on Bond Issue Route 3. Four steel spans at 160 feet each, one steel span at 95 feet, and nineteen reinforced concrete deck girder spans at 50 feet each. Structure so designated that the 95-foot span may be converted into a lift span, should the interests of navigation require it. Estimate of cost $287,810.00.
6. Shippingsport bridge over the Illinois River at LaSalle, on Bond Issue Route 2. Seven steel spans at 200 feet, one steel span at 215 feet, and two reinforced concrete deck girder approach spans at 42 feet each. The 215-foot span may be converted into a lift span at some future date. Estimate of cost, $492,580.00.

Following is a list of several of the largest bridges constructed during 1924:

1. Steel bridge over the Mackinaw River near Kappa, on State Bond Issue Route 2. One span at 120 feet and two spans at 80 feet each. Contract price, $43,811.34.

2. Combination steel and concrete bridge over the Kaskaskia River near Bruce, on Bond Issue Route 32. One steel span at 125 feet, one steel span at 85 feet, and four reinforced concrete deck girder spans at 40 feet each. Contract price, $49,666.99.

3. Combination steel and concrete bridge over Big Muddy Creek near Clay City, on Bond Issue Route 12. One steel span at 125 feet and fourteen reinforced concrete deck girder spans at 40 feet each. Contract price, $67,357.03.

4. Combination steel and concrete bridge over the Embarrass River at Newton, on Bond Issue Route 33. One steel span at 150 feet and fifteen reinforced concrete girder spans at 40 feet each. Contract price, $75,271.77.

5. West Station Street bridge over the Kankakee River at Kankakee, on Bond Issue Route 17. Five reinforced concrete open spandrel arches at 70 feet each. Roadway, 30 feet, and two 7-foot sidewalks. Contract price, $123,908.71.

The amount of bridge work done each year, from 1906 to 1924 is given in the following table:

TABLE IX—SUMMARY OF BRIDGE WORK TO DECEMBER 31, 1924.

Year.	Plans and specifications prepared.	Estimated cost.	Contracts let on State plans.	Contract price.	Foreign plans approved.
1906	15	----------	11	$ 37,035.00	Plans prepared by County Superintendent of Highways and others outside of Division of Highways.
1907	113	----------	48	41,519.00	
1908	149	----------	64	165,674.00	
1909	122	----------	92	133,285.00	
1910	203	----------	141	148,432.00	
1911	241	----------	127	238,903.00	
1912	214	----------	150	212,694.00	
1913	238	$ 342,052.00	139	200,834.00	5
1914	269	470,363.00	109	184,792.00	269
1915	707	984,420.00	565	541,509.00	230
1916	735	1,169,743.00	439	566,657.00	653
1917	480	812,614.00	502	582,993.00	503
1918	206	499,702.00	169	277,130.00	443
1919	231	761,458.68	202	514,897.00	725
1920	443	2,841,896.22	301	2,208,494.84	261
1921	384	2,134,476.49	337	1,909,455.67	362
1922	374	2,365,726.45	317	1,775,066.00	839
1923	484	3,359,109.03	413	3,170,269.46	1,451
1924	420	4,220,819.17	258	1,594,035.90	886
Total	6,028	$19,962,380.04	4,384	$14,503,675.87	6,627

The above table does not include bridges and culverts built in connection with State aid, Federal aid, and State bond issue road work, as such structures are included in the reports on road construction. In 1924, plans were prepared for 5,362 bridges and culverts, to be constructed in connection with State road contracts at an estimated cost of $1,463,115.51. Adding this to the bridge work given in the table above, the total output for the year was 5,782 plans for bridges and culverts, estimated to cost $5,683,934.68. The average cost of preparing plans and specifications was 1.4685 per cent of the estimated cost of the work.

Table X classifies the work according to the funds which were used.

TABLE X—CLASSIFICATION OF BRIDGE WORK FOR 1924.

Classification.	Plans prepared.		Contracts awarded.		
	Number.	Estimated cost.	Number.	Estimated cost.	Contract price.
County bridges	271	$ 716,607.79	168	$ 479,748.24	$ 429,266.54
State bridges	149	3,504,211.38	90	1,272,587.43	1,164,769.36
In State road contracts	5,362	1,463,115.51		(With pavement)	
Total	5,782	$5,683,934.68	258	$1,752,335.67	$1,594,035.90

Other work performed during the year 1924:

Plans checked and approved for County Superintendents of Highways	886
Existing bridges analyzed for strength	12
Shop drawings for steel bridges checked	45
Shop inspection for steel bridges	52

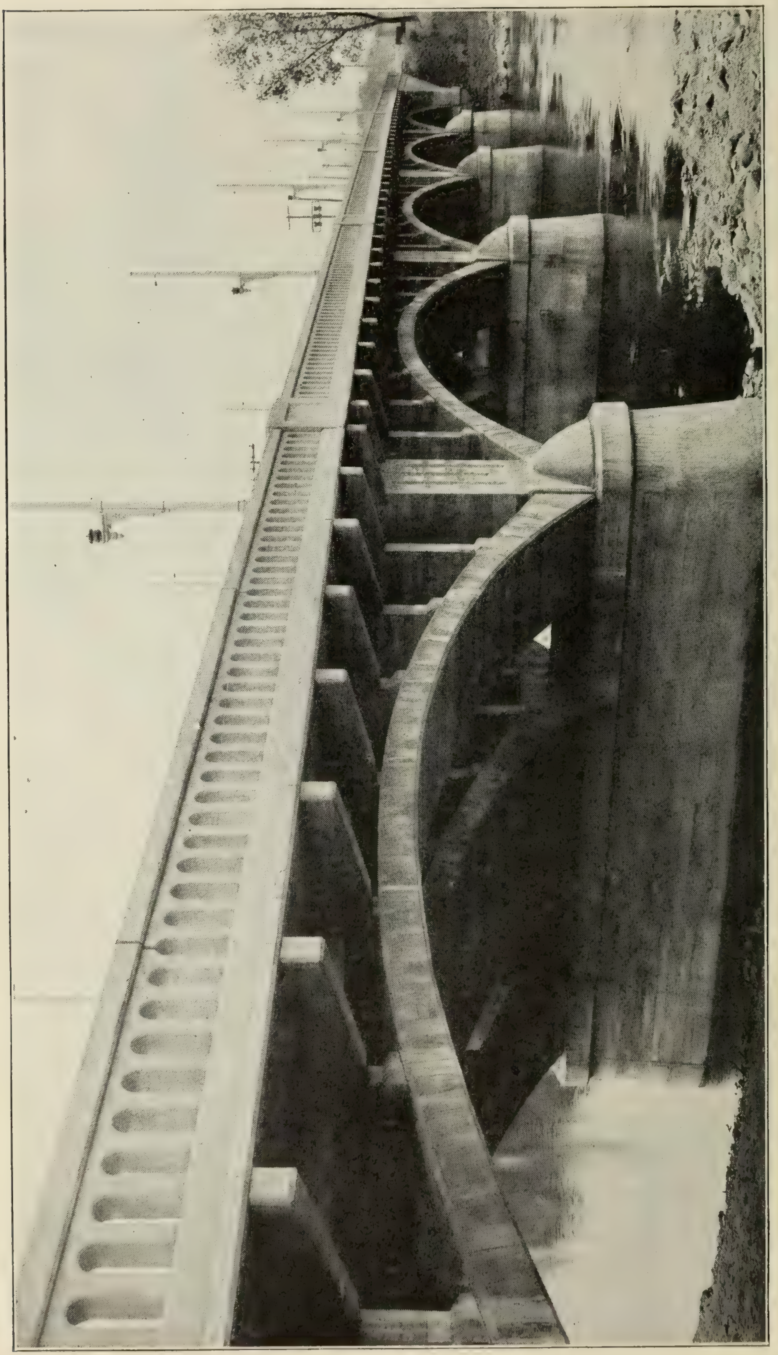


Figure 10.—West Station Street Bridge over Kankakee River on Route 17. Five 70-foot arches, 30-foot roadway, and two 7-foot walks. Contract price—$123,908.71.

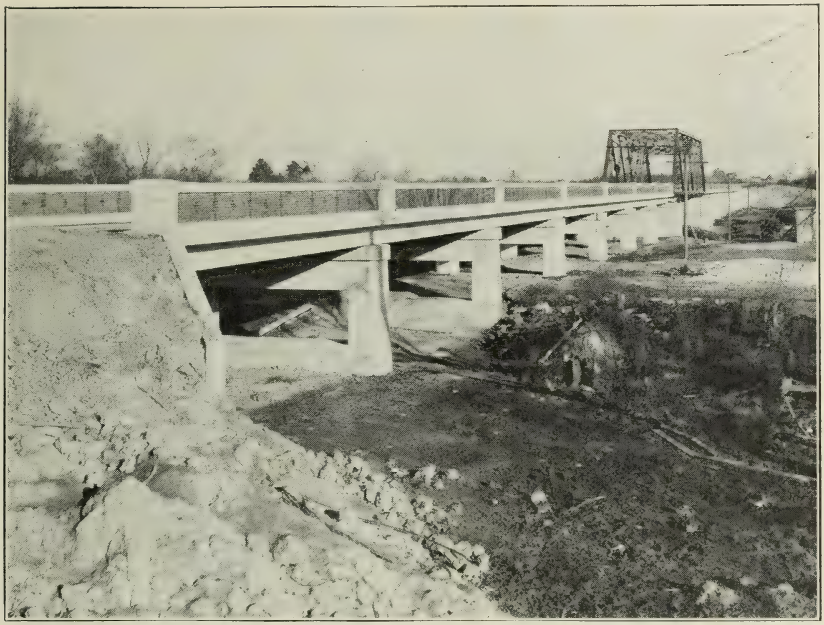


Figure 11.—Combination steel and concrete bridge over Big Muddy Creek near Clay City, on Route 12. Spans, one at 125 feet, and fourteen at 40 feet. Contract price—$67,357.03.

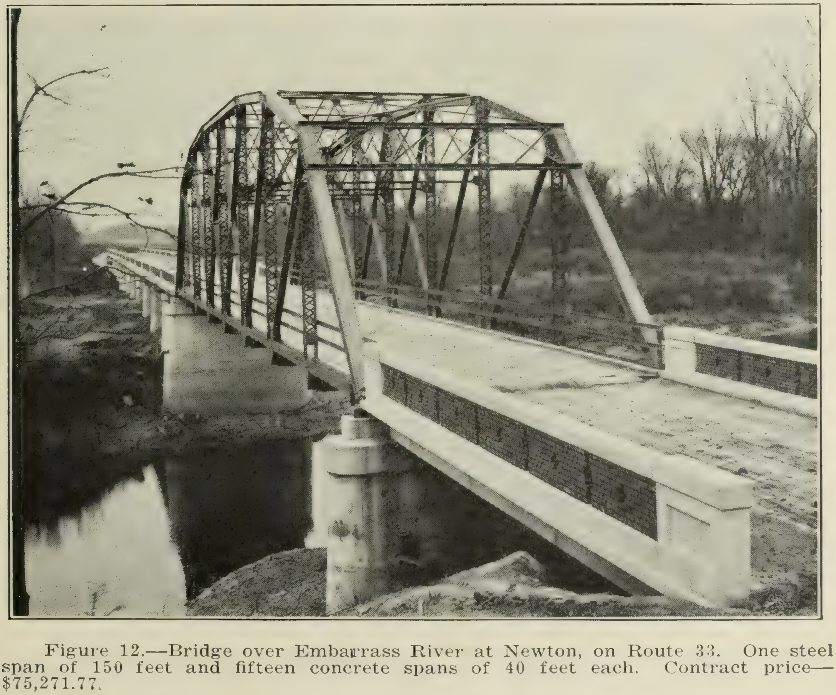


Figure 12.—Bridge over Embarrass River at Newton, on Route 33. One steel span of 150 feet and fifteen concrete spans of 40 feet each. Contract price—$75,271.77.

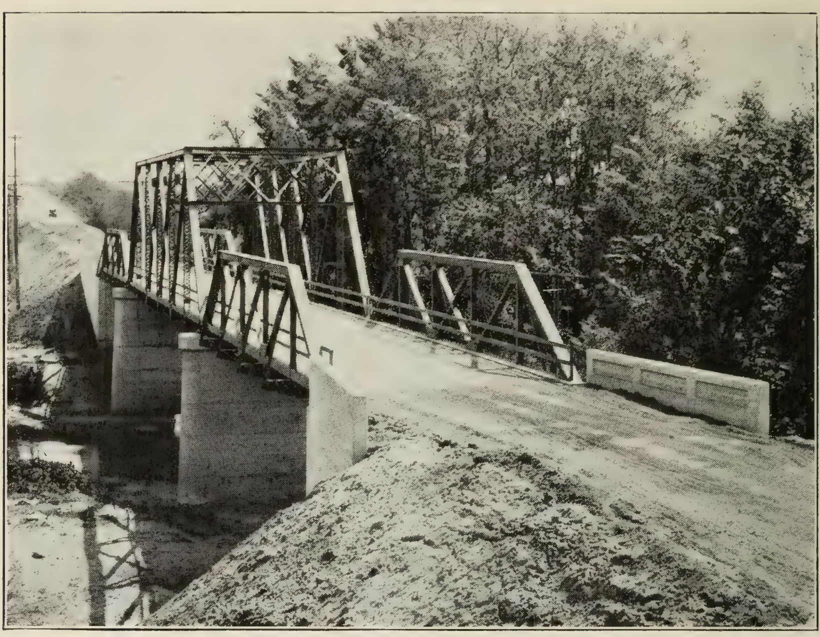


Figure 13.—Steel bridge over Mackinaw River near Kappa, on Route 2. Spans, one at 120 feet and two at 80 feet each. Contract price—$43,811.34.

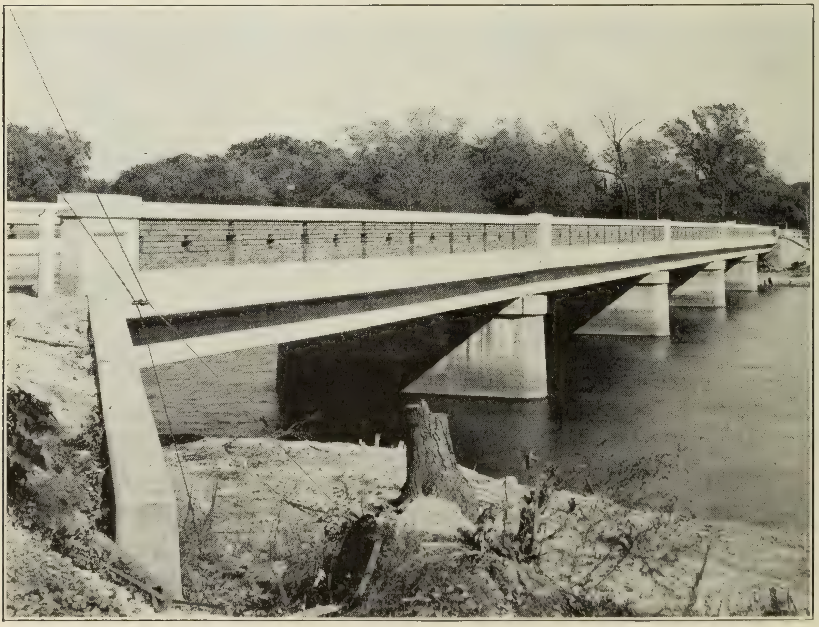


Figure 14.—Reinforced concrete bridge over Kankakee River east of Kankakee, on Route 17. Five spans at 55 feet each. Contract price—$47,700.92.

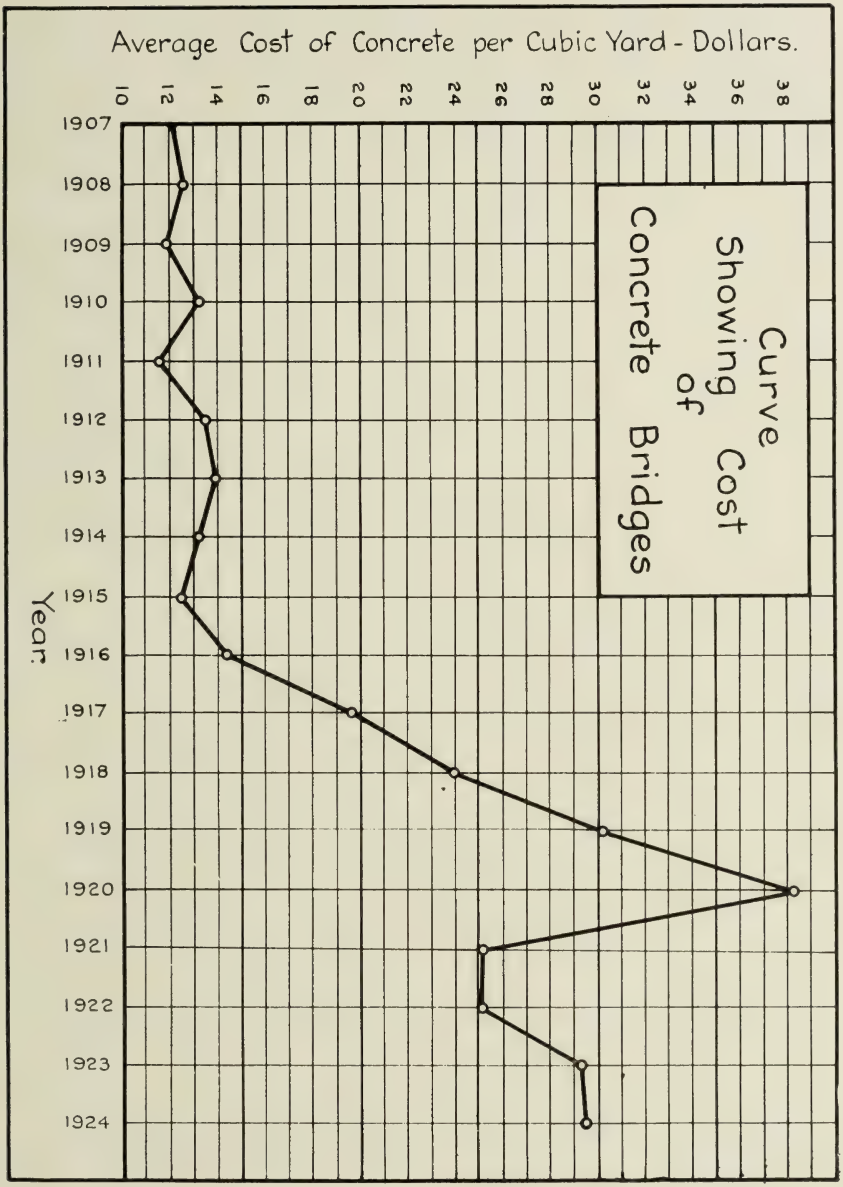


Figure 15.—This curve shows the average cost of concrete bridge work from 1907 to 1924. The cost per cubic yard includes reinforcing steel, cement, and all other items of construction cost. The fact that the 1924 price is practically equal to that of 1923 indicates that prices are becoming stabilized.

BUREAU OF CONSTRUCTION.

During 1924 there was completed on the State bond issue system 1018.2 miles of pavement, and on the county system under section 15d, 211.3 miles; a total of 1229.5 miles. With a few exceptions, this entire mileage was Portland cement concrete, 18 feet wide. In addition, there was completed under separate contracts 387 miles of heavy grading, totaling 7,500,000 cubic yards of earth work; and 312 bridges, totaling 87,335 cubic yards of concrete. Ninety-eight per cent of all the paving work under contract in 1924 was completed, a record heretofore never attained.

Labor conditions throughout the State were generally normal. Traffic conditions were exceptionally good. Only a few instances were recorded where delayed shipments necessitated shutting down or retarding the work. Weather conditions were generally normal, although heavy rains and destructive floods prevailed in the western and northern part of the State during a portion of the season.

During 1924, 149 paving contractors, 62 grading contractors and 90 bridge contractors operated. During the period from May 15th to November 1st, an average weekly output of 44.55 miles of concrete pavement was maintained, a figure in excess of any previous year's record. A new weekly record for a single concrete mixer of 10,405 lineal feet of 18 foot concrete pavement and a new daily record of 2,669 lineal feet were established. Thirty-seven per cent of the contractors completed 10 miles of pavement or over with one mixer outfit.

The standard pavement cross-section shown elsewhere in this report was used exclusively, and past construction methods were generally followed. The policies established in preceding years, namely, completion of heavy grading and bridge contracts in advance of the paving work; awarding contracts before January 1st; establishment of a definite program of progress on each section, are undoubtedly largely responsible for the high percentage and large mileage of completed pavement.

Many "through routes" were completed. In addition, practically all the large grading and bridge projects on the $60,000,000.00 system were either completed or under contract.

The matter of closer cooperation between the contractors and the Department was given considerable study. Conferences were held with both representative groups of contractors and with individuals. Common problems were discussed and it is believed that the results were beneficial.

The progress on every contract is followed by means of a progress chart. As a safeguard, each bidder is required to submit with his bid experience and equipment questionnaires. These are investigated and the responsibility of the contractor determined. Thus, the irresponsible contractor is eliminated and an organization of contractors maintained which is capable of accomplishing the program anticipated.

Transportation problems are given careful study. Refunds amounting to about $21,000.00 were collected, which amount is appreciably less than in previous years, indicating a low level in freight rates. An active interest has been taken in proposed rate changes and where protest was warranted, efforts were directed accordingly. Records show that, in most cases, suspension of rates, at least, was secured, thus protecting shipments.

The two State penitentiaries shipped 80,460 tons of stone during 1924. It is evident by requests from townships and counties that the demand for this stone still far exceeds the supply.

Contracts for 4,050,000 barrels of cement were closed in 1924 and 3,508,937 barrels were shipped. The policy of storing cement during the early months of the year was continued, and up to May first, there had been placed in storage approximately 1,300,000 barrels. Due to excellent traffic conditions, no appreciable delay was experienced by the contractors due to shortage of cement. Even during the peak months of August, September, and October, every cement company was able to maintain its specified shipping schedule, indicating that the companies have developed their capacity and shipping arrangements to meet the requirements for road construction as well as the requirements of the general trade.

The five day labor outfits completed 54.95 miles of pavement during 1924. Four of the outfits were utilized on sections of usual length, while the fifth was organized primarily to close in small gaps of one to two miles length, which gaps could not be economically let by contract.

TABLE XI—GENERAL SUMMARY OF 1924 CONSTRUCTION.

Paving contractors, including 15d	149
Grading contractors, including 15d	62
Bridge contractors, including 15d	90
Total number of paving, grading, and bridge contractors having work in 1924	269
Paving sections under contract in 1924	346
Macadam, K. R. asphalt, and gravel sections under contract in 1924	21
Grading sections under contract in 1924	131
Bridge sections under contract in 1924	205
Number of paving mixers, including 15d	183
Number of paving outfits operated with Industrial Railway	30
Number of paving outfits operated with trucks	152
Number of paving outfits operated with teams	1
Number of paving outfits operated with central proportioning plants	163
Number of paving outfits operated with central mixing plants	18
Number of paving outfits operated from stock piles	2
Largest day's run in feet	2,669
Largest week's run in feet	10,405
Largest month's run in feet	31,676

11,750 men and 3,000 teams were employed directly in the construction of road and bridge work this year.

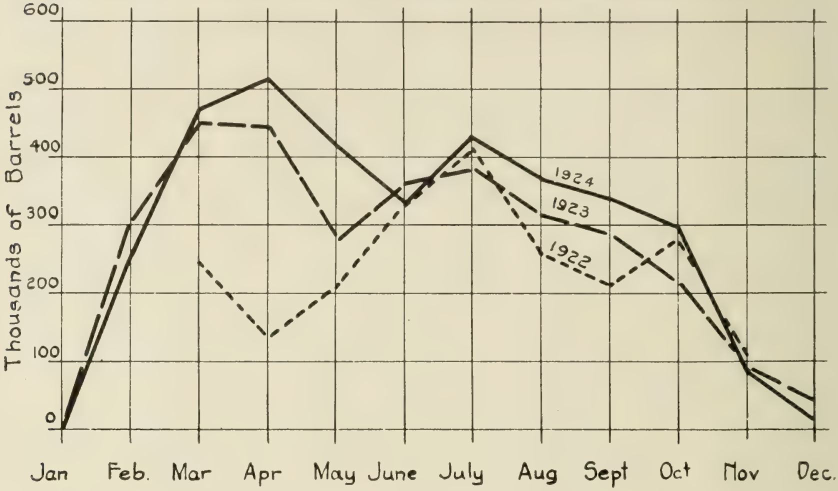
TABLE XII—SUMMARY OF MILEAGE CONSTRUCTED DURING 1924.

	Pavement—miles.	Grading—miles.	Bridges—number.
Carried over from 1923	581.53	215.59	193
Awarded in 1924	677.69	185.31	149
Additions in 1924	4.49	12.76	4
Total for 1924	1,263.71	413.66	346
Constructed in 1924	1,229.48	386.72	312
Carried over to 1925	34.23	26.94	34

NOTE.—The mileage carried over from 1923 includes considerable mileage awarded late in the year for construction during 1924.

COMPARATIVE CURVES

ACCUMULATIVE TOTAL OF CEMENT SHIPMENTS, 1922-23-24.



COMPARATIVE CURVES

MONTHLY CEMENT SHIPMENTS, 1922-1923-1924.

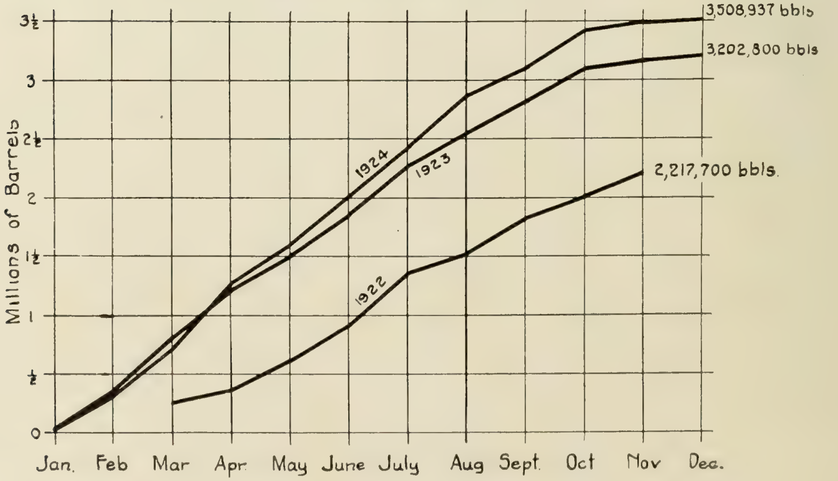


Figure 16.—Cement Data.

COST ANALYSIS OF 18-FOOT CONCRETE PAVEMENT.

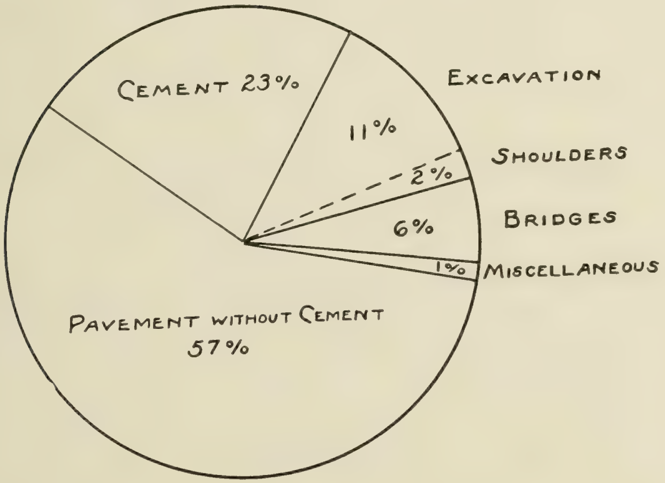


Figure 17.

Miscellaneous includes guard fence, catch basins, section markers, gutters and all extra work not included under other headings.

NOTE.—This information compiled from 113 miles of 18-foot concrete pavement. Sections taken from all parts of the State and includes all heavy grading and bridge contracts on these sections.

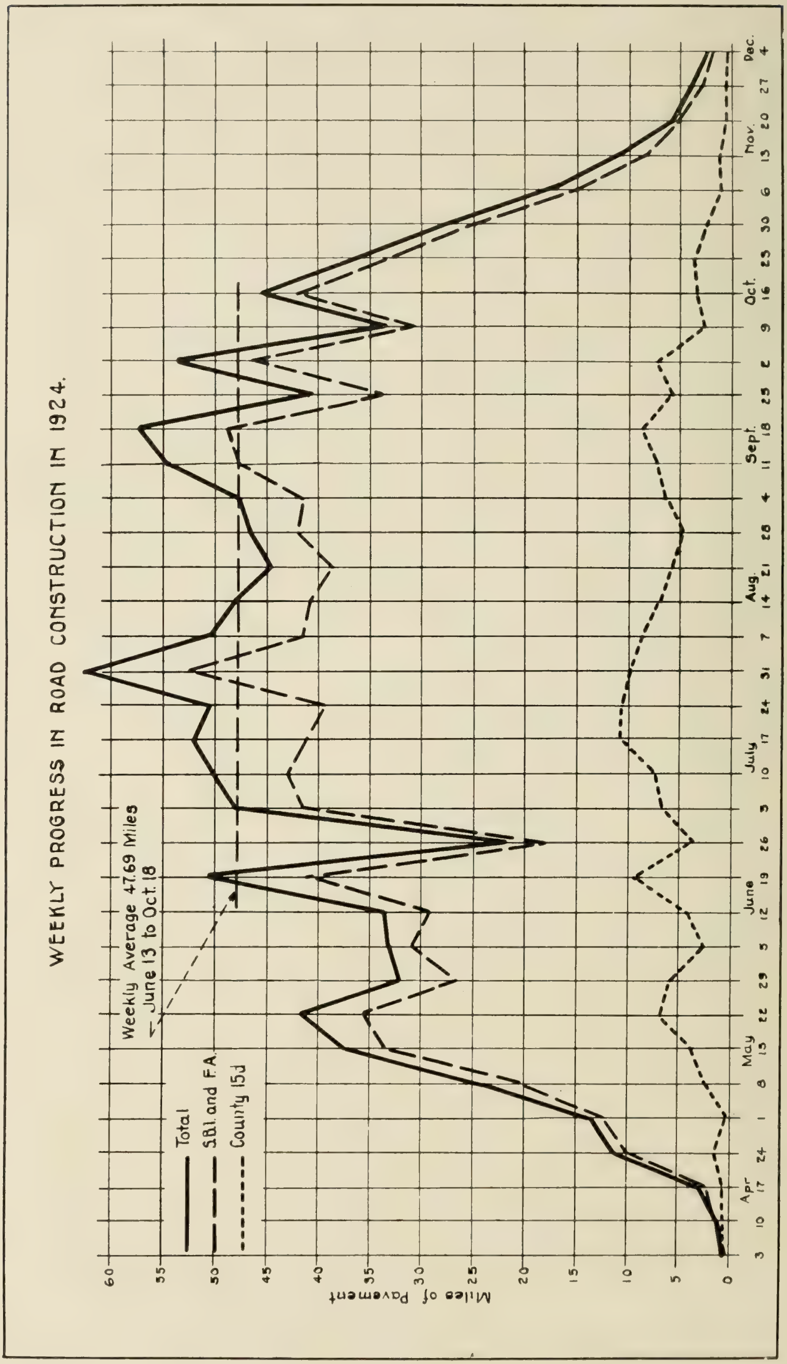

WEEKLY PROGRESS IN ROAD CONSTRUCTION IN 1924.
Weekly Average 47.69 Miles
June 13 to Oct. 18
Total
S.B.I. and F.A.
County 15d
Miles of Pavement
60
55
50
45
40
35
30
25
20
15
10
5
0
Apr.
3
10
17
24
May
1
8
15
22
29
June
5
12
19
26
July
3
10
17
24
31
Aug.
7
14
21
28
Sept.
4
11
18
25
Oct.
2
9
16
23
30
Nov.
6
13
20
27
Dec.
4

Figure 18.

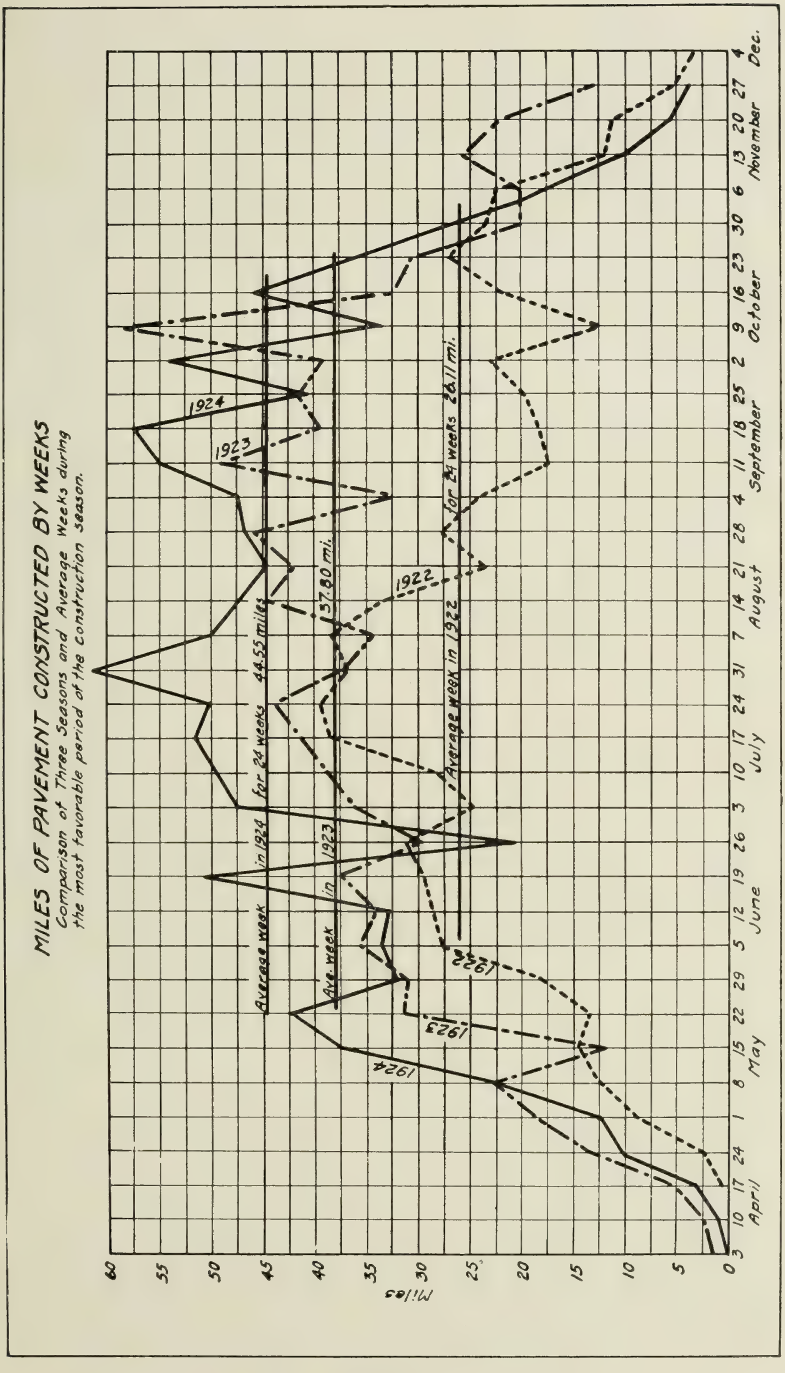

MILES OF PAVEMENT CONSTRUCTED BY WEEKS
Comparison of Three Seasons and Average Weeks during the most favorable period of the construction season.
Average week in 1924 for 24 weeks 44.55 miles
Ave. week in 1923 37.80 mi.
Average week in 1922 for 24 weeks 26.11 mi.
1924
1923
1922
1924
1923
1922
Miles
60
55
50
45
40
35
30
25
20
15
10
5
0
3 10 17 24 April
1 8 15 22 29 May
5 12 19 26 June
3 10 17 24 31 July
7 14 21 28 August
4 11 18 25 September
2 9 16 23 30 October
6 13 20 27 November
4 Dec.

Figure 19.

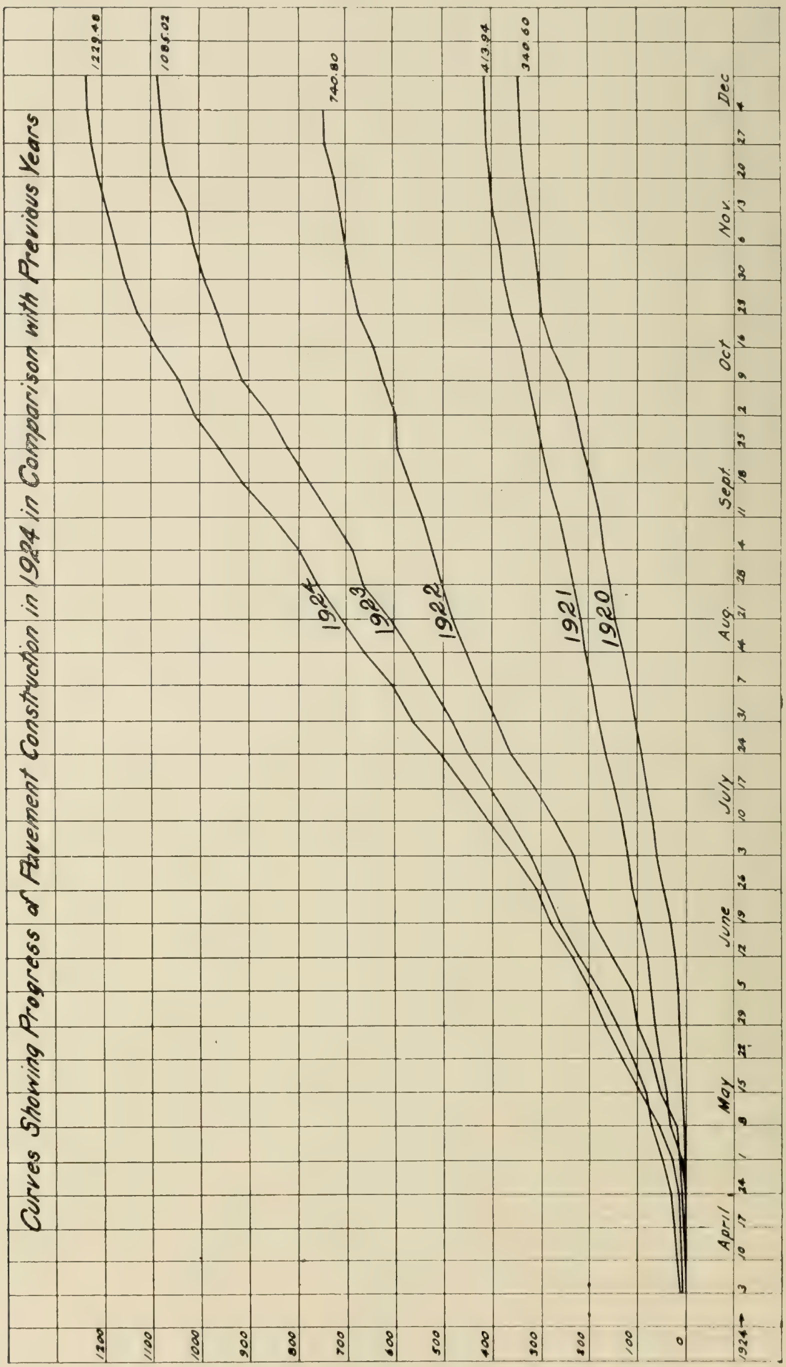

Curves Showing Progress of Pavement Construction in 1924 in Comparison with Previous Years
1229.48
1085.02
740.80
413.94
340.60
1924
1923
1922
1921
1920
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
1924→
April
3
10
17
24
May
1
8
15
22
29
June
5
12
19
26
July
3
10
17
24
31
Aug.
7
14
21
28
Sept.
4
11
18
25
Oct
2
9
16
23
30
Nov.
6
13
20
27
Dec
4

Figure 20.

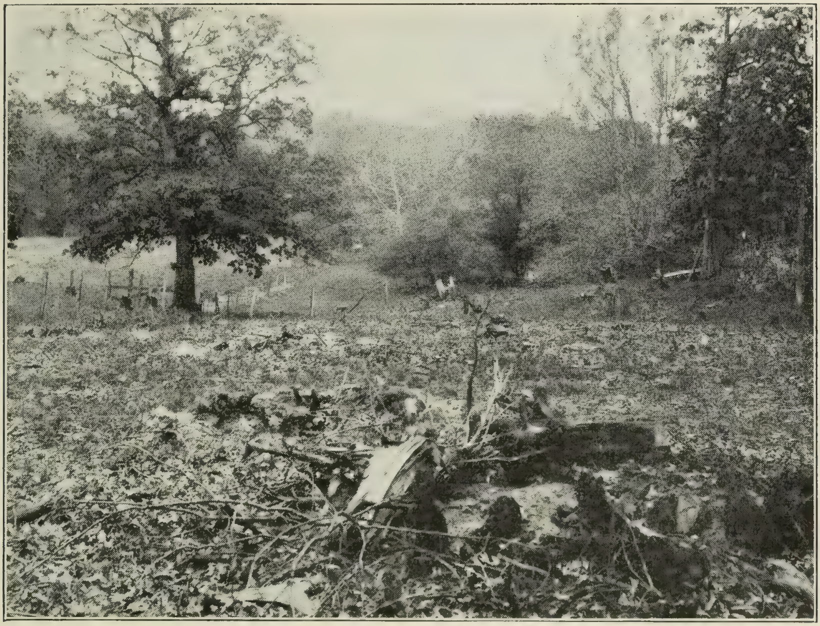


Figure 21.—Before construction: Relocation on Route 2 south of Heyworth, McLean County.

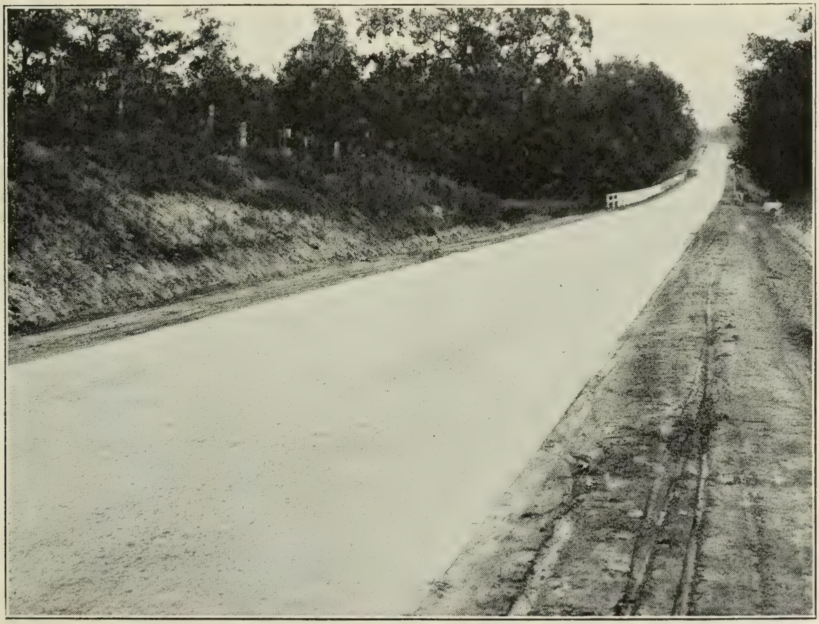


Figure 22.—After construction: Relocation on Route 2 south of Heyworth, McLean County.

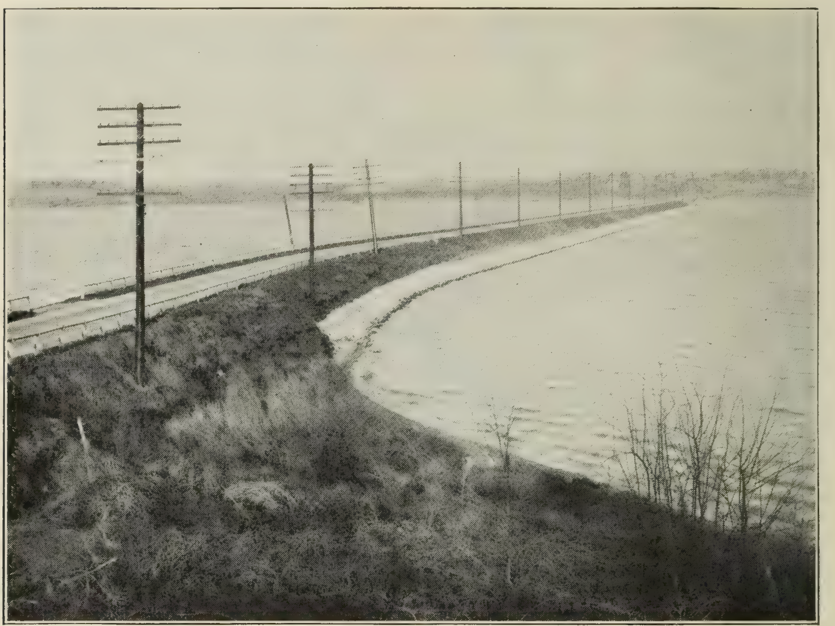


Figure 23.—Looking east across Lake Decatur, Route 10 in Macon County.

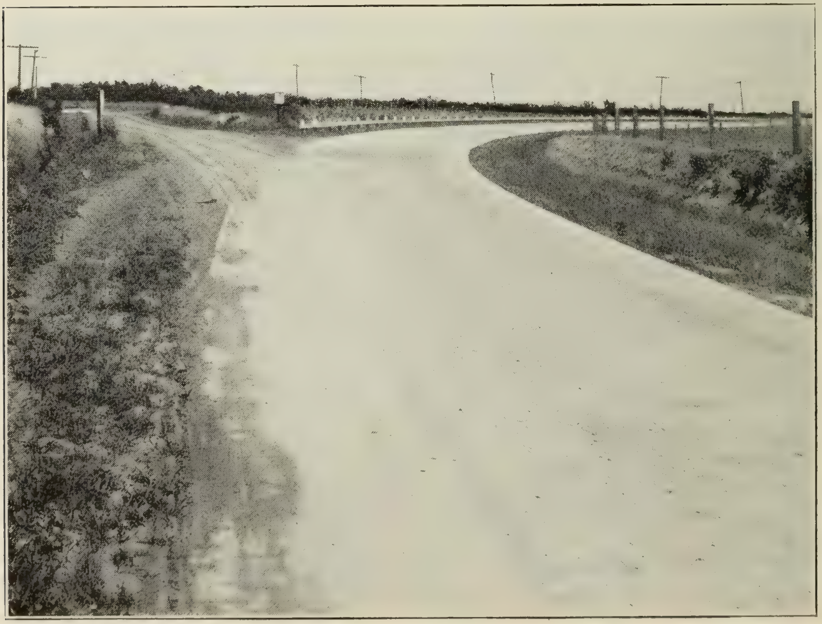


Figure 24.—Easy curve replacing sharp turn, Route 36 near Winchester, Scott County.

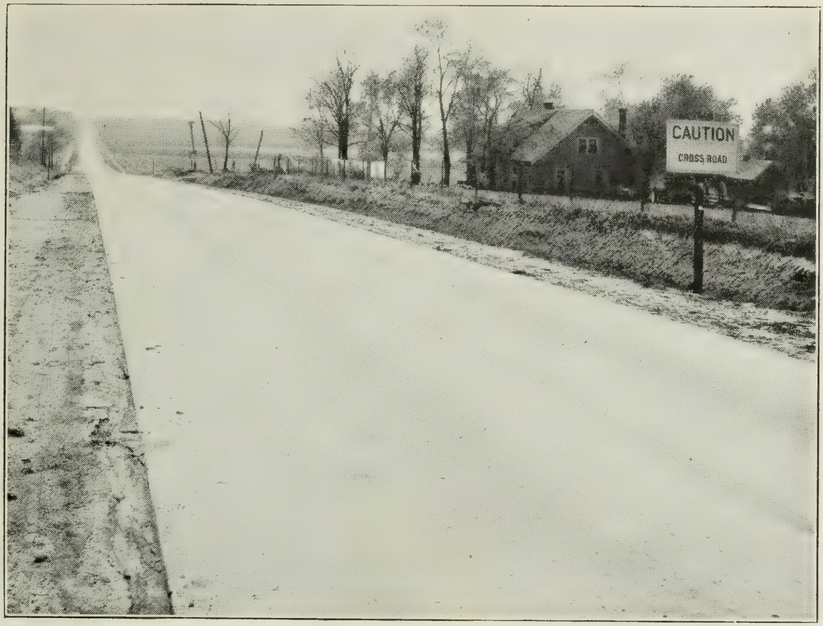


Figure 25.—Route 2 north of Pana, near intersection with Route 16.

BUREAU OF MAINTENANCE.

The maintenance of the improved roads of the State of Illinois as well as of the uncompleted bond issue routes and the detours around construction is supervised by the Bureau of Maintenance. Each of the nine districts of the State has its own maintenance organization, which handles the maintenance problems encountered in its respective district.

In April, 1924, the Department adopted the policy of maintaining the uncompleted portions of the bond issue system as well as the detours around construction, which added 2,416 miles to the maintenance system. In each district the work under maintenance is divided into patrol sections, the earth patrols being approximately 8 to 10 miles in length and the improved sections from 15 to 20 miles in length. Each section is under the direct supervision of a patrolman who maintains it in as nearly perfect condition as possible. The patrolman is required to fill all cracks which appear in the pavements, shape the shoulders, cut the weeds and vegetation, clean out the ditches and drains, add additional material to the surface of the road when necessary, and perform minor repairs to culverts, bridges, etc. The patrolman makes a daily report to the district office in order that the district engineer may be kept informed. Each patrolman is required to take care of his patrol without assistance, as far as practical.

A number of maintenance sections are grouped together and placed under the direction of a supervising patrolman who instructs the patrolmen in regard to their work and sees that such work is done in a neat, efficient and workmanlike manner.

The following tables show the maintenance costs, both for surfaced roads and for detours and temporary roads, for 1924:

TABLE XII—STATEMENT SHOWING THE COST OF MAINTENANCE FOR ALL TYPES OF SURFACED ROADS DURING 1924.

Type.	Weighted average mileage maintained.	Cost for paved surface.	Average cost per mile.	Upkeep of highway exclusive of wearing surface.	Average cost per mile.	Total cost of maintenance.	Average cost per mile.
Brick	141.46	$ 21,497.48	$151.97	$ 38,230.55	$270.25	$ 59,728.03	$422.22
Concrete	3,003.90	366,837.13	122.12	584,452.68	194.56	951,289.91	316.68
Bit. concrete	19.21	8,411.95	437.89	5,778.52	300.81	14,190.47	738.70
Bit. macadam	37.75	6,118.16	162.07	6,429.86	170.33	12,548.02	332.40
W. B. macadam	45.22	18,316.83	405.06	3,055.90	67.58	21,372.73	472.64
Gravel	443.41	77,117.57	173.92	17,085.34	38.53	94,202.91	212.45
Total	3,690.95	$498,299.12	$135.01	$655,032.85	$177.47	$1,153,331.97	$312.48

NOTE.—Gravel roads are on the State aid system. They are in short sections and widely separated, and carry very light traffic. This accounts for the low average cost per mile.

TABLE XIV—STATEMENT SHOWING THE COST OF MAINTENANCE FOR ALL TYPES OF DETOURS AND TEMPORARY ROADS DURING 1924.

Type.	Mileage maintained.	Cost for traveled way.	Average cost per mile.	Upkeep of highway exclusive of wearing surface.	Average cost per mile.	Total cost of maintenance.	Average cost per mile.
Gravel	134.70	$ 29,640.28	$ 220.04	$ 6,025.82	$44.74	$ 35,666.10	$ 264.78
Macadam	15.67	3,713.55	236.98	152.48	9.73	3,866.03	246.71
Bit. macadam	2.4	226.23	94.26			226.23	94.26
Shale	.22	3,029.43	13,770.14			3,029.43	13,770.14
Cinders	4.60	7,106.00	1,544.78	59.80	13.00	7,165.80	1,557.78
Earth	1,792.13	279,159.87	155.77	64,582.91	36.04	343,742.78	191.81
Oil earth	371.10	58,391.62	157.35	16,610.94	44.76	75,002.56	202.11
Total	2,320.82	$381,266.98	$164.28	$87,431.95	$37.67	$468,698.93	$201.95

SNOW REMOVAL.

It is the policy of the Department to keep all improved through routes open to traffic the year round. When heavy snow falls occur, snow plows pulled by horses or caterpillar tractors, or trucks equipped with snow plow attachments are used to prevent, insofar as possible, any interruption of traffic.

RECONSTRUCTION.

In the vicinity of Chicago, where the increased volume of heavy traffic far exceeded the loads which some of the older pavements were designed to carry, it was necessary to reconstruct approximately 3.25 miles of pavement this year. This worn out pavement was replaced with the standard type of 18-foot concrete pavement.

TRAFFIC LINE.

The standard pavement cross-section provides a longitudinal construction joint along the center of the pavement. This joint is covered with a strip of asphalt which then serves two purposes; namely, to seal the joint, and to serve as a traffic guide line. A special machine for placing this asphalt strip has been designed by this Department. As soon as a section of pavement is opened to traffic, the line is applied, and it is renewed each year. By dividing the pavements into two definite traffic lanes, this line has done much to promote safety on Illinois' highways.

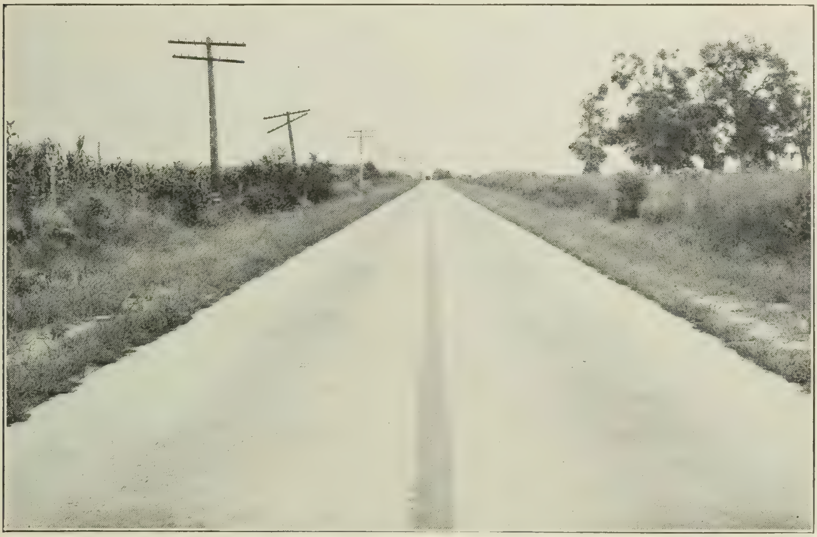


Figure 26.—View of State road showing traffic line.

PERMITS.

Property owners are required to secure the approval of the Department for the construction of additional entrance culverts along the improved State highways. The same also applies to power transmission lines, sewers, gas and water mains, or any other enterprises affecting the maintenance or use of the highway. As soon as approval is given, permits are issued to the parties concerned giving them authority to make the desired improvements. During the year 1924, 981 permits were issued.

STATE HIGHWAY PATROL OFFICERS.

To enforce the provisions of the Motor Vehicle Act and also the Road and Bridge Laws, the Division of Highways maintains a force of State highway patrol officers. This force has been increased from time to time until at present the organization consists of one chief and 82 officers. One of the most important duties of the highway patrol officers is to weigh all trucks which appear to exceed the weight limitation provided by the Motor Vehicle Act. Second in importance is the curbing of careless or reckless driving. The patrol officers are instructed to use their authority in a conservative way, reflecting the dignity of the law which they represent; to use judgment and be courteous in all dealings with the public; to aid law abiding travelers by giving advice as to directions, condition of the roads, location of garages, and other helpful information.

During the year 1924 there were 11,732 speeders warned, and 5,575 trucks weighed, of which 884 were found to be overweight. Four hundred and forty-nine arrests were made for driving while intoxicated, stolen cars, lights, etc. There were 674 arrests made for overloading and 614 arrests for speeding.

HIGHWAY MARKING.

There have been few radical changes made in the marking system during 1924, efforts having been largely directed to perfecting the system previously adopted. The Department has endeavored to make the system so complete that it is virtually impossible for the motorist who follows the marking to become lost. The system adopted serves a twofold purpose: first, to promote safety, and second, to furnish directory information to the travelling public.

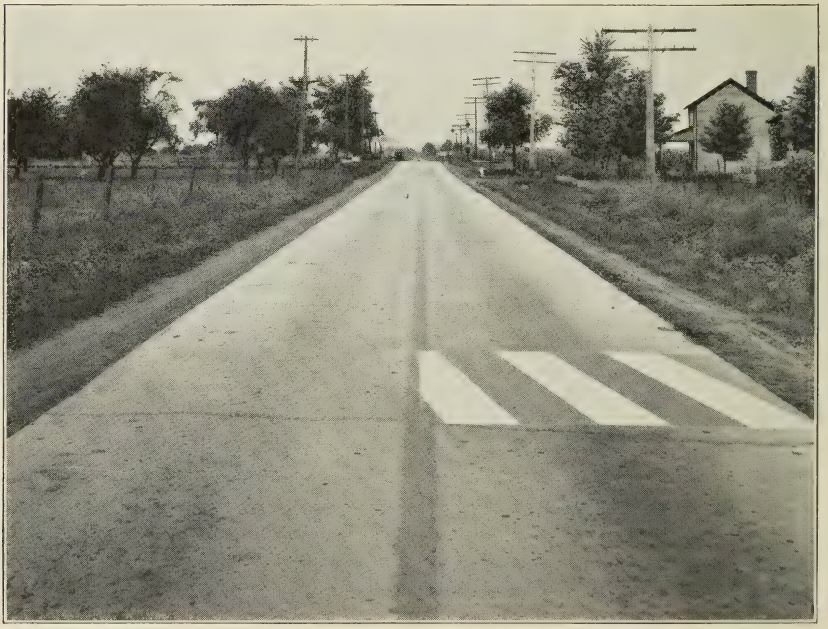


Figure 27.—Railroad crossing warning stripes painted on pavement.

The first purpose is accomplished by maintaining warning signs at all points of potential danger. These signs, which are placed 400 feet each way from the point of danger, are illustrated in Figures 28, 29, and 30. Note that three different words of warning are used to denote the three different degrees of danger.

At railroad grade crossings, the "Danger" sign is supplemented by a cautionary marking placed on the right-hand side of the pavement. This marking consists of a series of diagonal stripes, alternately painted black and white. Series of stripes are placed at intervals of 100 feet, beginning 400 feet from the railroad crossing. It is found that this is a method of warning which even the most inattentive driver can scarcely fail to notice. Figure 27 illustrates this warning device.

For the purpose of directing traffic along the various highways, all routes are marked by number. The standard marking consists of the route number enclosed in a State outline, both painted black on a white background. On approaches to curves, the letters "L" or "R" are added below the route number to indicate left or right turns. Where two or more routes follow the same course, all route numbers are included in the marking. When a route is being used for a detour or temporary location, the words "Detour" or "Temporary" are added above the State outline.

Markers are stenciled on telegraph, telephone, or light poles along the highway, where such poles are available. Where there are no poles alongside the highway, cast iron route markers, or wooden sign boards on which the marker is painted, are erected. At all right-angled turns in cities and villages, signs are placed bearing the route marker, and an arrow indicating the direction of turn.

At prominent street corners within cities or villages, signs are placed indicating the directions and distances to the main objectives on the routes. Similar signs, but without the arrow indicating direction, are placed at the corporate limits on the right-hand side of the road as the traveler leaves the city.

Various other signs are placed to help the traveler keep his bearings. A "City Limit" sign, bearing the name and population of the place the traveler is entering, is erected at the corporate limits of each city or village. All railroad signs, in addition to bearing the words "Danger—Railroad," also carry the name of the railroad. Likewise, at all bridges, a sign is placed showing the name of the stream crossed. Signs indicating direction and distance to towns or points of historical interest not located on the State highways, are erected at the road intersection nearest the place named.

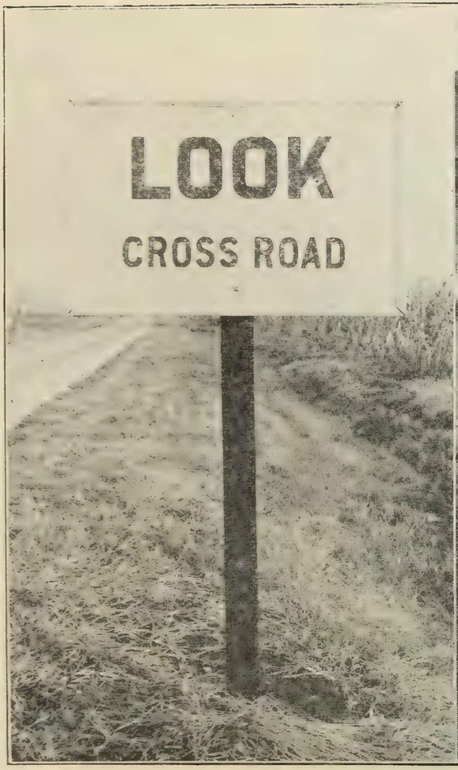


Figure 28.

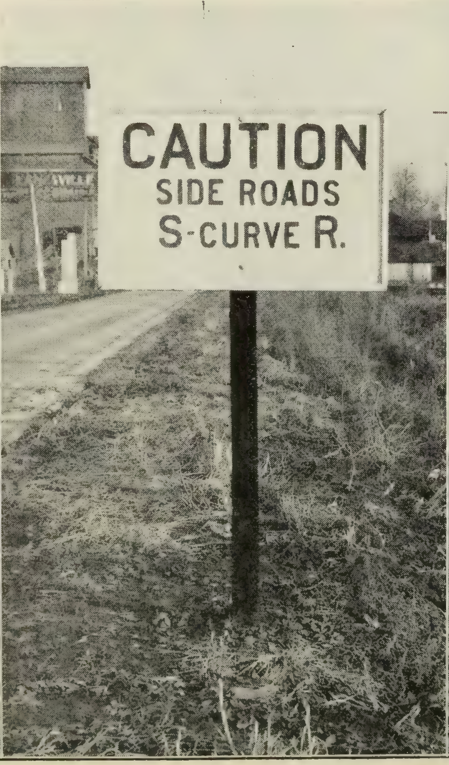


Figure 29.

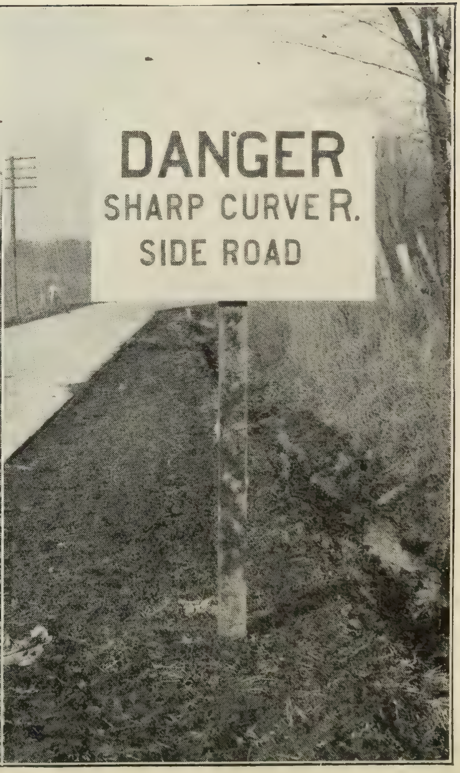


Figure 30.

"Look" signs are erected where it is unnecessary to slacken speed, but where the driver should be on his guard.
"Caution" signs are erected where some slackening of speed and a greater degree of care are necessary.
"Danger" signs are erected only where there is imminent danger.

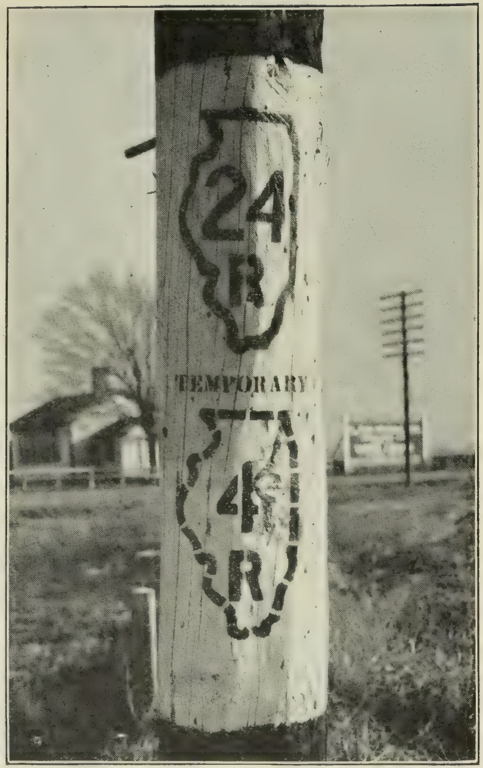


Figure 31.

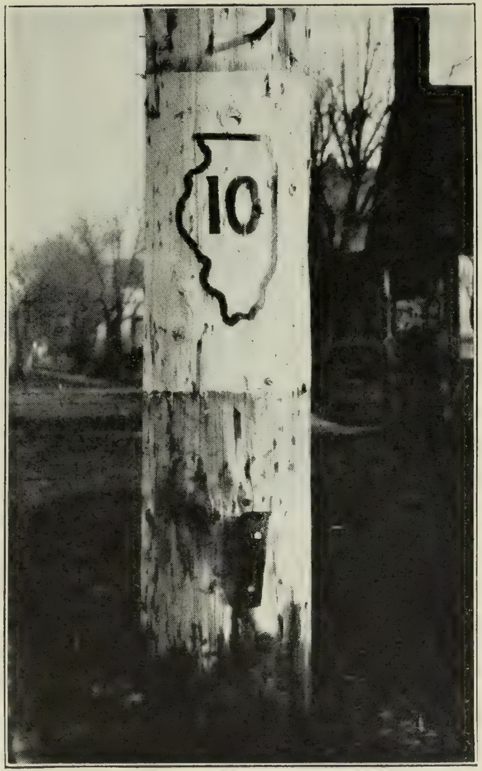


Figure 32.

METHOD OF SHOWING MARKING ON POLES ALONG ROUTE.

Outline of State carrying route number is stenciled in black on a white background on telephone, telegraph and light poles. The letters "L" or "R" indicate approach to curves. The word "Temporary" appears above the outline in the case of temporary locations of routes.

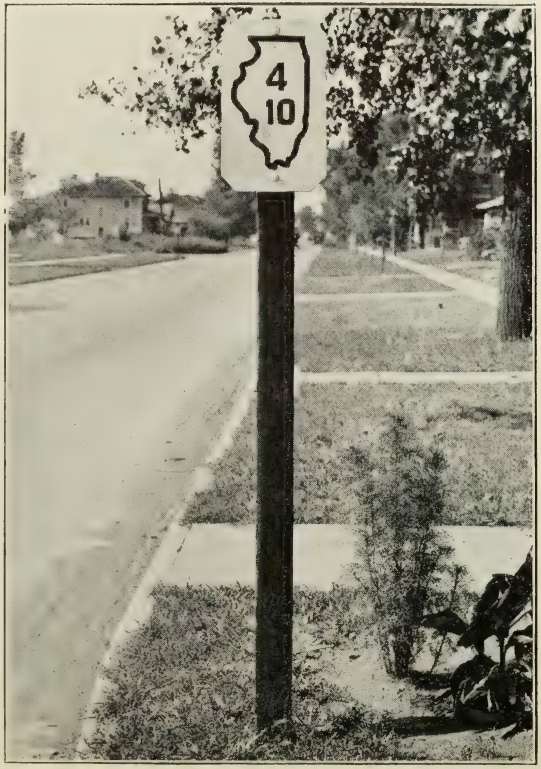


Figure 33.

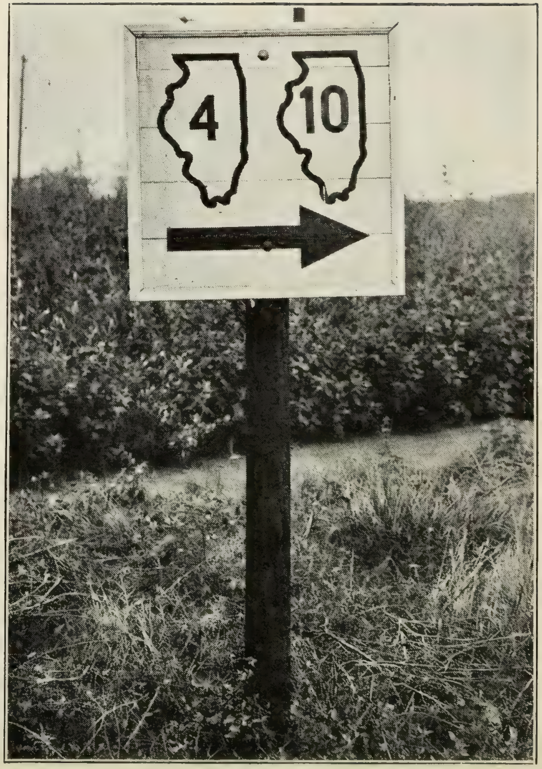


Figure 34.

DIRECTORY SIGNS ERECTED IN CITIES AND VILLAGES WHERE NO POLES ARE AVAILABLE.

The small sign is painted on a 2x12x20-inch board fastened to a creosoted post. A somewhat larger sign is erected at right-angle turns. The double sign is used where two or more routes follow the same course.

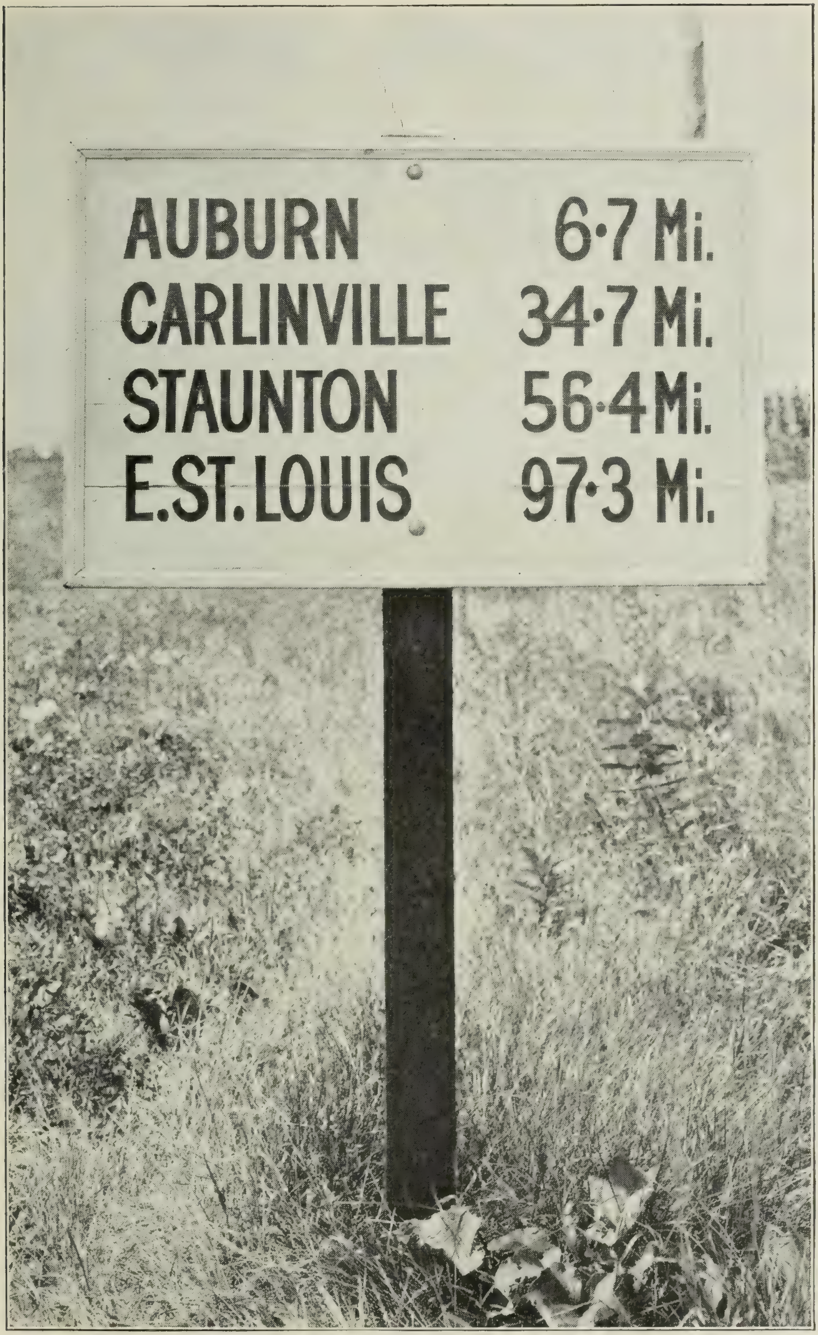


Figure 35.—Sign erected at city limit showing main objectives and distances thereto.

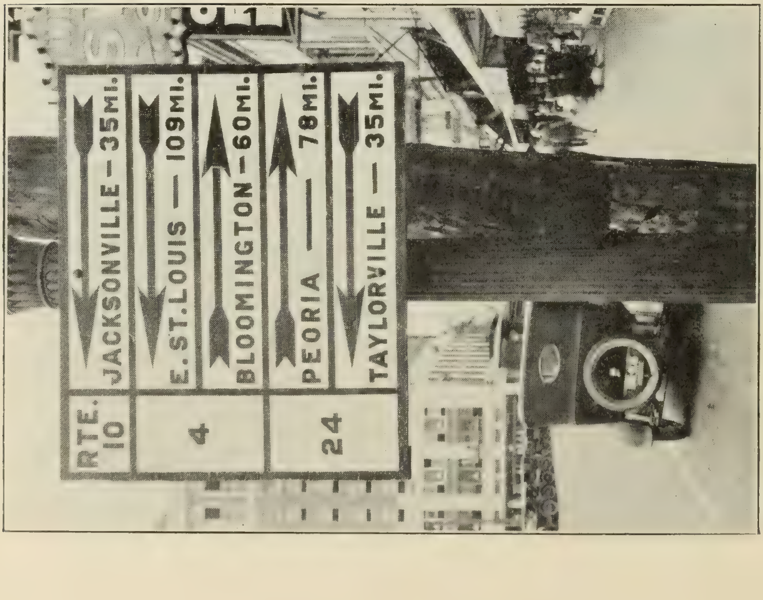


Figure 36.—Sign erected at prominent street corners, indicating direction of route and main objectives with distance thereto.

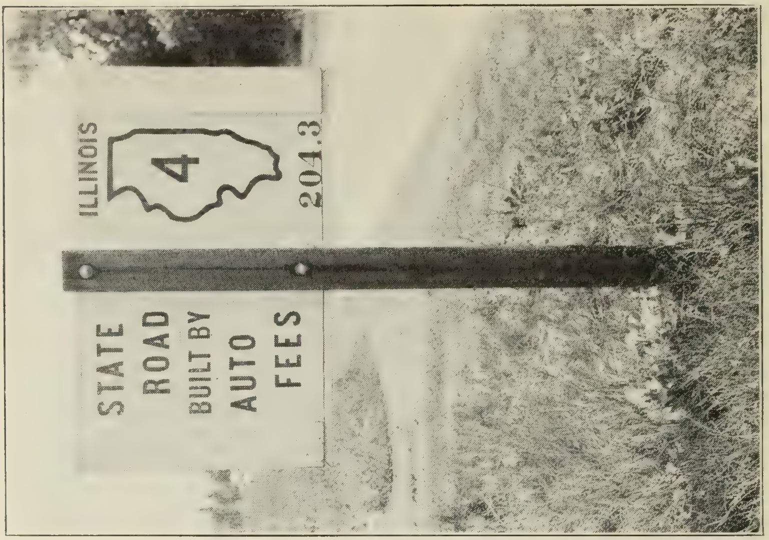


Figure 37.—"State Road" built by "Auto Fees." This statement, which appears on the reverse side of all warning signs, is used to acquaint the public with the fact that all bond issue roads are built entirely from auto fees.

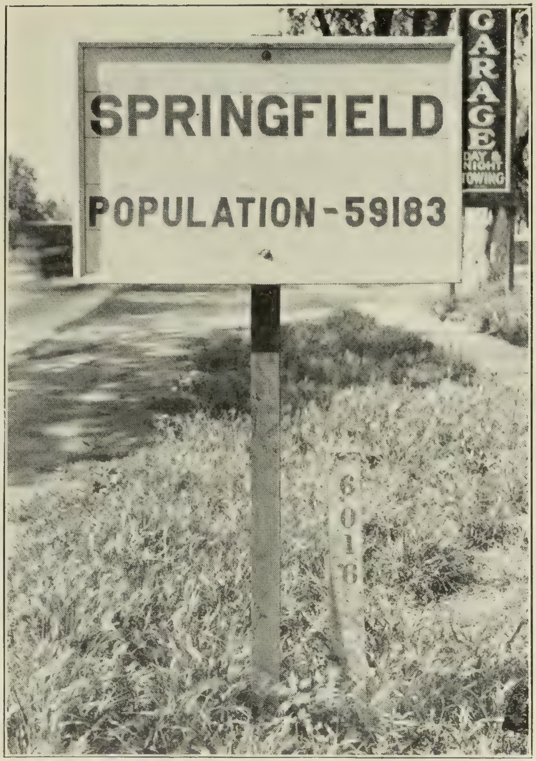


Figure 38.—Sign erected at city limits.

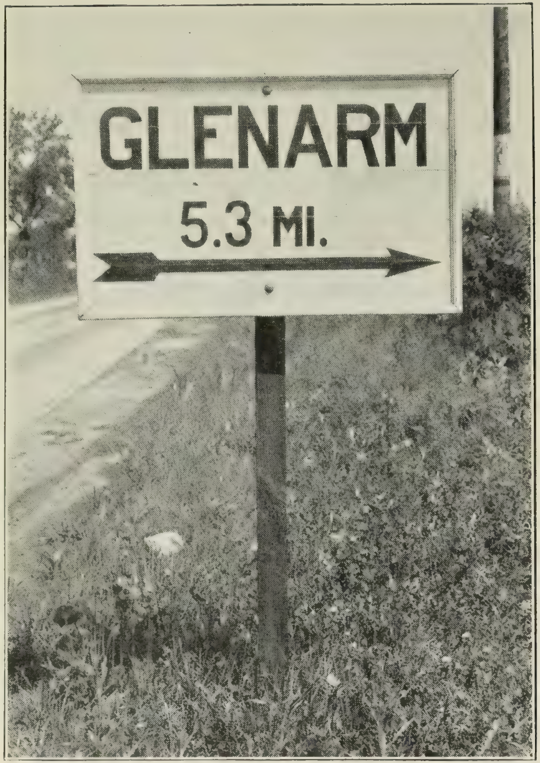


Figure 39.—Sign indicating direction and mileage to towns not located on State highway system.

REVISION OF COST ACCOUNTING SYSTEM.

A new system of cost accounting was designed and installed September 1, 1924, which will make possible better and more detailed information concerning maintenance costs both on surfaced roads and on detours and temporary routes.

Under the new system, costs are to be collected under the following main heads:

(1) Maintenance of surfaced roads.
(2) Maintenance of detours, unpaved and temporary routes.
(3) Additions and betterments or improvements added to existing roads.
(4) Reconstruction.
(5) Policing of State highway system.

Under the heading of maintenance of surfaced roads, costs are to be collected under the following sub-heads:

(1) Wearing surface or pavement.
(2) Metal shoulders.
(3) Earth shoulders.
(4) Ditches and drains.
(5) Bridges and culverts.
(6) Markers and safety signs.
(7) Guard fence.
(8) Cutting and clearing vegetation.
(9) Cleaning traveled way.
(10) Snow removal.

Costs under these sub-heads are divided between the following:

(1) Direct labor.
(2) Direct material.
(3) Direct expense.
(4) Indirect or overhead expense apportioned to each partol on the basis of the number of labor hours worked on each patrol and each sub-account as shown above.

BUREAU OF MATERIALS.

The primary function of the Bureau of Materials is to insure that all materials used in the construction of highways in the State of Illinois are properly inspected and conform to the specifications. This work is carried on by inspectors at the origin of the materials, so that the greatest service may be given the contractor and producer with the least loss of time to the State. These inspectors are organized under the direct supervision of the district engineers of materials, who cooperate with the Construction Bureau and upon whom rests the responsibility of obtaining a quality and type of material that conforms to the specifications.

During 1924, an increase in the mileage of concrete pavements constructed consequently increased inspection activities. In order to satisfactorily check the materials, inspection was made at 103 aggregate plants, 14 cement mills, 17 steel mills and warehouses, and 8 road

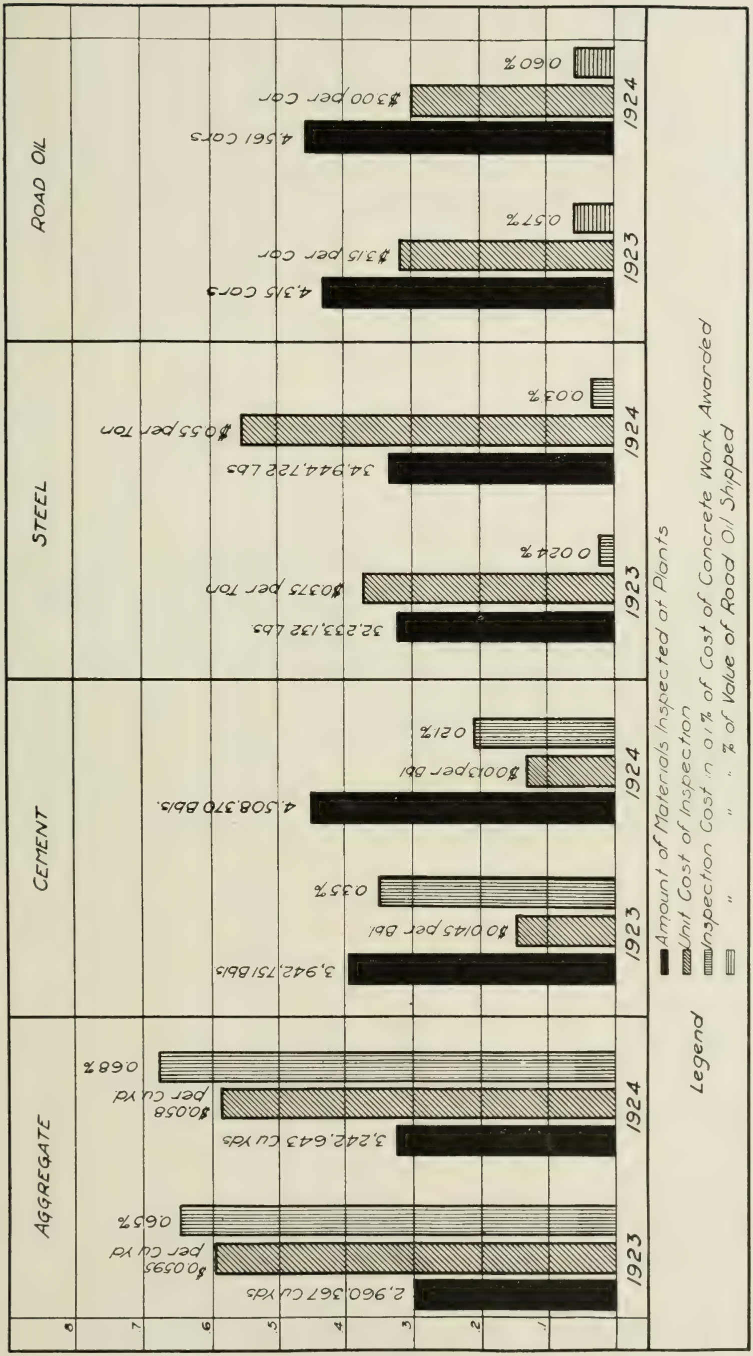


Figure 40.—Chart showing quantities of material and unit costs of inspection for 1923 and 1924.

oil refineries. The extent of this inspection may be realized when it is noted that the activities spread over ten of the central states.

The cost of inspection (Figure 40) for practically every material was decreased as compared to the previous year, due to increased construction. Also, inspection was made for adjoining states at points where inspectors were maintained, which resulted in considerable remuneration even though the service was offered at cost.

The inspection of road oil is a service carried on by the Bureau of Materials for the counties and townships. Inspectors are sent to the refineries (the origin of shipments) to check the quality of the oil before shipment to Illinois. Approximately 42,000,000 gallons of road oil were thus inspected. Investigations were also carried on during the year, in cooperation with the counties, to determine the best method of using these oils and the proper manner of constructing earth roads and maintaining them through the use of oil.

A secondary function of this Bureau is the making of investigations relative to the best construction and design practice. As a result of the Bates Road tests, completed in 1923, investigations of the design of pavement slab and other construction factors led to several studies which have been considered of the greatest importance in highway research.

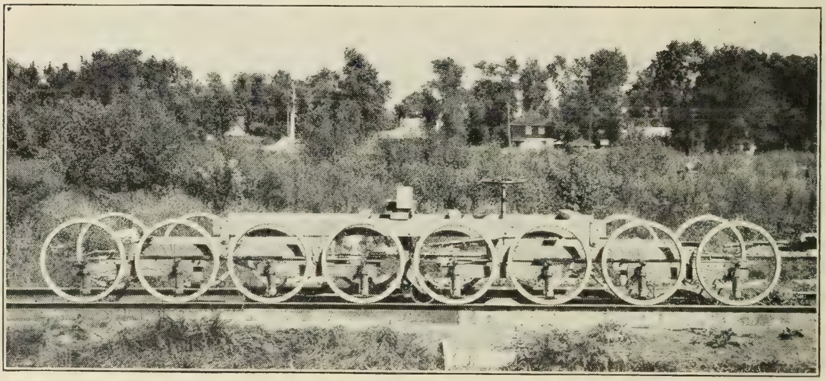


Figure 41.—Sixteen-wheel Profilometer, on calibration track.

Perhaps the investigation of the most interest was the design and proof of the profilometer, shown in Figure 41. This machine, consisting of a recording device mounted on 16 wheels, is so arranged that it accurately records all roughness of the pavement, and definitely determines the location and amount of all depressions and high spots. The machine has been proved and checked over approximately 250 miles of pavement surface. It provides means of insuring that the pavement surface meets the requirements of the specifications, and also affords a comparison of the results of various finishing machines and construction outfits.

The investigation of the stress resulting in the pavement under an impact load was possibly one of the most important projects undertaken, since it has been indicated by highway engineers that this stress

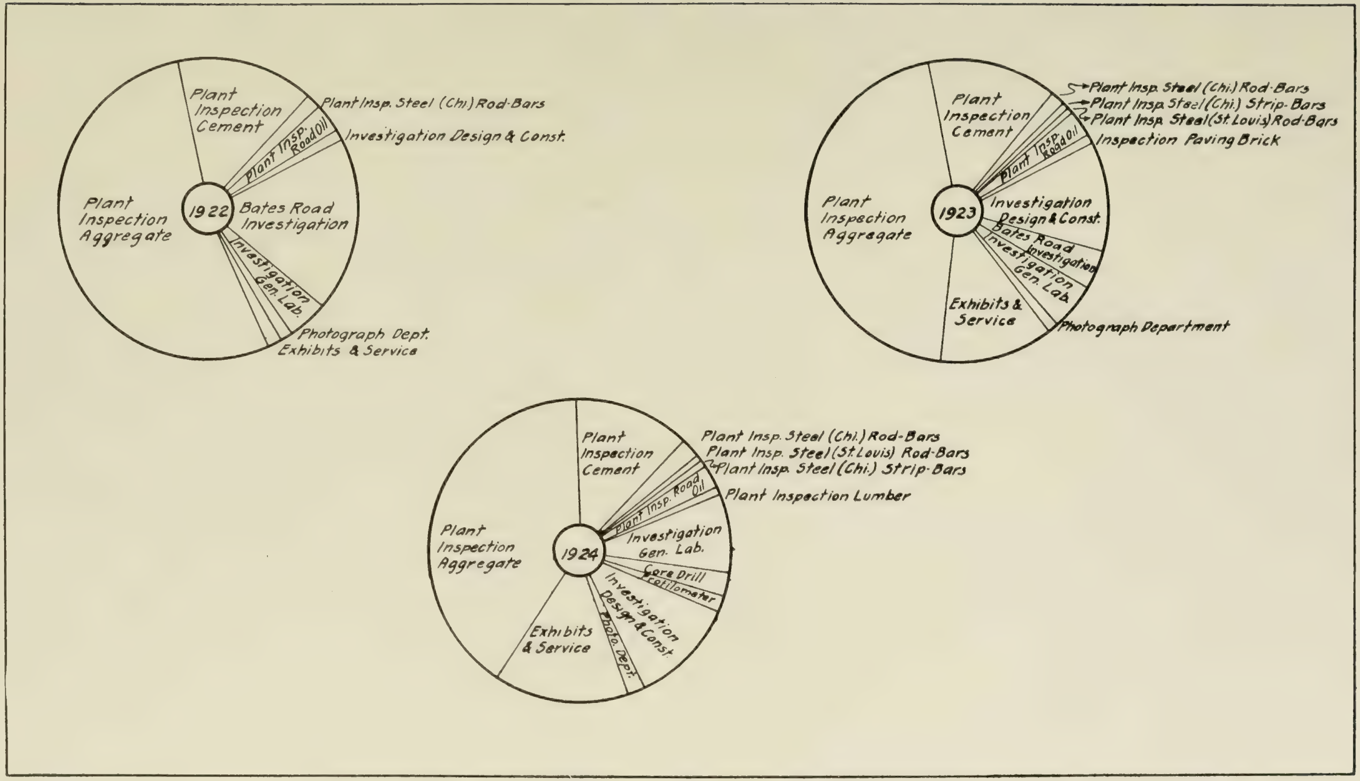


Figure 42.—Chart showing relative proportion of various activities of Bureau of Materials by distribution of expense for years 1922 to 1924.

is considerably greater than that from static loads. No device had been known for measuring directly the stress under impact, but within the past year the electric strain gauge has been designed, which it is believed will solve the problem of studying impact by directly determining stresses at any point of the pavement.

Another investigational problem was that of the suitability of various bituminous materials for crack and joint filler, and especially of the white crack filler, which makes the crack less unsightly.

Other investigations which have been considered are the effect of temperature changes in concrete, and the effect of electrolysis in concrete pavements.

Research problems in concrete materials showed the relation of gradation to yield; effect of flint in coarse aggregate; properties of cement, especially "Lumnite" cement; the expansion and contraction of concrete with moisture; and the suitability of various grades of steel for use in highway construction.

The information gained through research projects has been exchanged through cooperation with the committees on materials of various engineering societies. Information relative to highway design and construction has been made public through exhibits sent to county fairs, and by the publication of numerous pictures.

Figure 42 shows relative proportion of various activities of the Bureau of Materials by distribution of expense of operation.

BUREAU OF MACHINERY.

The primary function of the Bureau of Machinery is the repairing and distribution of such road building machinery as has been received from the United States Department of Agriculture, and of certain classes of machinery and equipment purchased by the State of Illinois for road building purposes.

The Division of Highways has received at various times large quantities of surplus war materials allotted by the United States Department of Agriculture. This Bureau is the receiving and distributing agent for these materials. Approximately 1,200 trucks, 12 locomotive cranes, 100 tractors, 5,000 tons of railroad rail, and 250,000 square yards of canvas, are some of the principal items which were received from the United States Government. This equipment and these supplies are used in building and maintaining the highways of the State.

A summary of the principal duties of the Bureau of Machinery is as follows:

To keep a record of all of the materials received from the United States Department of Agriculture, and to make a report to the United States Government concerning its use and disposal.

To maintain, under the supervision and direction of each district engineer, a garage for the repair of the various kinds of mechanical equipment in the respective districts.

To repair and distribute trucks which are to be rented to counties, townships and State institutions.

To furnish and distribute to the five day labor construction organizations and to the Maintenance Bureau such machinery and other materials, supplied from the surplus war materials, as can be used in connection with their work.

To place in good condition all mechanical appliances and supplies which are used in the Division of Highways, State institutions and the various departments of the State; also the equipment which is used for rental to contractors having State or Federal aid road contracts.

To maintain a system of inspection of the mechanical equipment owned by the Division of Highways. Inspectors make periodical trips to determine whether the equipment is being maintained in a satisfactory manner, and to advise the lessees on the care and operation of the equipment under lease.

BUREAU OF AUDITS.

ACCOUNTING AND AUDITING.

During the year 1924 the accounts and cost records of the division were placed on a more business like basis with a view of ultimately placing all the accounts on a double entry basis, to be controlled by a set of control books. Recommendations were also made for the consolidation of all of the accounts and cost records, which arrangement it is believed will make possible better control over the revenues, appropriations, and expenditures of the division. Recommendations were also made for the installation of better and more accurate cost records to determine the relative efficiency of the various organization units, to secure cost units and costs of performing work for each unit in the entire organization.

The accounts of the division at present are divided along functional lines as follows:

1. Administration and Engineering.
2. Construction—which is divided into Contract Construction and Day Labor Construction.
3. Maintenance—which is divided into the following:
    - Maintenance of Surfaced Roads.
    - Maintenance of Detours, Unpaved and Temporary Routes.
    - Additions and Betterments Cost.
    - Reconstruction Cost.
    - Highway Patrol Officers' Cost.
4. Equipment.

The total expenditures of the division reached its peak in 1924, during which year there was expended by this division a total of $39,462,335.59 covered by 67,022 vouchers.

The following statement represents the collections of the Division of Highways for the calendar year 1924:

TABLE XV—STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS AND SOURCES FROM WHICH COLLECTED FROM JANUARY 1, 1924 TO DECEMBER 31, 1924.

Year.	Month.	Engineering revenue.				Construction revenue—Amount.	Main tenance revenue.		Equipment revenue.				Total.
		Testing.	Inspection.	Refunds, claims.	Miscellaneous.		Work done.	Miscellaneous.	Rentals.	Sales.	Repairs.	Miscellaneous.	
1924	January				$ 983.36	$ 9,622.51	$ 551.71	$1,635.12	$ 3,327.50	$13.57	$178.19	$ 75.00	$16,386.96
	February				1.00	.80	371.14						372.94
	March	$3,463.57	$ 482.20	$ 18.39	542.94	4,699.29	223.18	93.82	7,603.93		108.59	567.94	17,803.85
	April	2,694.65			70.70	467.82		264.08	13,291.82		10.12		16,799.19
	May	1,148.04			691.34	591.24	69.99	32.35	17,257.14	81.90	59.81	225.74	20,157.55
	June	32.97		34.75	1,067.22	402.66	81.05	1,080.26	24,240.35	5.61	339.04		27,283.91
	July	1.73			156.80	15,865.97			29,641.44		260.25		45,926.19
	August	5.00	886.09		425.23	6,048.42	29,818.79	1,891.02	2,015.50	14.86	503.12		41,608.03
	September	14.67	1,622.70	208.87	636.88	24,152.24	97.54	2,341.09	6,204.67		721.21		35,999.87
	October				732.31	3,044.40	44.76	14.00					3,835.47
	November	10.00	2,052.29	56.46	294.43	17,806.27	112.20	181.00	300.00		392.60	2.70	21,207.95
	December				1,634.46	5,593.10	67.84	381.10					7,676.50
	Total	$7,370.63	$5,043.28	$318.47	$7,236.67	$88,294.72	$31,438.20	$7,913.84	$103,882.35	$115.94	$2,572.93	$871.38	$255,058.41

REPORTS AND FINANCIAL ESTIMATES.

In the following pages will be found financial and statistical statements regarding the work of the Division of Highways.

The following statement represents the revenue which the division has drawn on which has accrued to the credit of the Road Fund during the years 1911 to 1924, inclusive:

TABLE XVI—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Total.
1911	$ 74,552.59			$ 74,552.59
1912	364,708.03			364,708.03
1913	499,802.45			499,802.45
1914	700,233.00			700,233.00
1915	903,284.09			903,284.09
1916	1,238,483.92			1,238,483.92
1917	1,629,445.26			1,629,445.26
1918	2,770,084.60		$ 85.00	2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50	3,765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68	11,111,995.56
Sub-total	$17,273,087.13	$5.724,799.05	$60,390.18	$23,058,276.36
1921	$ 6,862,125.83	$3,802,430.46	$221,645.55	$10,886,201.84
1922	7,904,219.71	1,733,334.86	132,495.77	9,770,050.34
1923	9,677,318.64	4,257,276.06	127,847.10	14,062,441.80
1924	11,557,838.94	3,565.058.69	300,045.58	15,422,943.21
Sub-total	$36,001,503.12	$13,358,100.07	$782,034.00	$50,141,637.19
Grand total	$53,274,590.25	$19,082,899.12	$842,424.18	$73,199,913.55

The following represents the appropriations made by the General Assembly from the Road Fund since 1913:

TABLE XVII—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For Maintenance.	For State highways.	For county refunds.	For cement plant.	For Fay Hunsley relief.	For gravel plant.	Interest on highway bonds.	Totals.
1913	$ 400,000.00									$ 400,000.00
1914	700,000.00									700,000.00
1915	1,000,000.00									1,000,000.00
1916	1,000,000.00									1,000,000.00
1917	1,200,000.00	$ 1,326,000.00								2,526,000.00
1918										
1919	500,000.00	26,600,000.00						$125,000.00		27,225,000.00
1920										
1921			$3,000,000.00	$20,000,000.00	$3,899,382.23	$5,000,000.00	$4,000.00		$1,000,000.00	32,893,382.23
1922										
1923			3,000,000.00	20,000,000.00	4,025,632.56	5,000,000.00			4,000,000.00	36,025,632.55
Total	$4,800,000.00	$27,926,000.00	$6,000,000.00	$40,000,000.00	$7,915,014.79	$10,000,000.00	$4,000.00	$125,000.00	$5,000,000.00	$101,770,014 79

The following statement represents the expenditures from the Road Fund shown under the proper appropriations for the years 1914 to 1924, inclusive:

TABLE XVIII—TOTAL ANNUAL EXPENDITURES FROM ROAD FUND SHOWN UNDER PROPER APPROPRIATIONS.

Year.	State aid.	Federal aid.	State highway.	Maintenance.	Refunds to counties.	Fay Hunsley relief.	Interest and principal on highway bonds.	Total expenditures.
1914	$ 364,202.39							$ 364,202.39
1915	662,516.23							662,516.23
1916	681,248.36							681,248.36
1917	1,141,567.05							1,141,567.05
1918	393,424.40	$ 190,578.78						584,003.18
1919	623,117.27	4,352,870.62						4,975,987.89
1920	472,568.30	11,108,931.33						11,581,499.63
1921	248,088.68	7,407,287.97	$ 4,526,651.22	$ 225,737.08	$ 719,273.18	$4,000.00		13,131,038.13
1922	32,784.91		6,837,603.37	640,486.78	1,798,184.50		$757,460.00	10,066,519.56
1923	25,975.27		9,234,214.69	1,110,209.41	1,411,337.49			11,781,736.86
1924			12,522,782.01	2,044,860.69	1,176,893.14		1,388,813.35	17,133,349.19
Total	$4,645,492.86	$23,059,668.70	$33,121,251.29	$4,021,293.96	$5,105,688.31	$4,000.00	$2,146,273.35	$72,103,668.47

The following statement represents the purpose of the expenditures made from the Road Fund for the years 1914 to 1924, inclusive:

TABLE XIX—EXPENDITURES FROM THE ROAD FUND 1911 TO 1924.

Year.	State aid construction.	Federal aid and S. B. I. construction.	Maintenance.	Refunds to counties.	Fay Hunsley relief.	Interest and principal on 60m bonds.	Total.
1914	$ 364,292.39						$ 364,202.39
1915	652,644.73		$ 9,871.50				662,516.23
1916	660,561.93		20,686.43				681,248.36
1917	1,106,034.79		35,532.26				1,141,567.05
1918	356,120.42	$ 190,578.78	37,303.98				584,003.18
1919	538,502.90	4,352,870.62	84,614.37				4,975,987.89
1920	263,765.75	11,108,931.33	208,802.55				11,581,499.63
Sub-total	$3,941,832.91	$15,652,380.73	$396,811.09				$19,991,024.73
1921	$115,167.91	$11,933,939.19	$ 358,657.85	$ 719,273.18	$4,000.00		$13,131,038.13
1922	32,768.68	6,837,603.37	640,503.01	1,798,184.50		$ 757,460.00	10,066,519.56
1923	25,975.27	9,234,214.69	1,110,209.41	1,411,337.49			11,781,736.86
1924		12,522,792.01	2,044,850.69	1,176,893.14		1,388,813.35	17,133,349.19
Sub-total	$173,911.86	$40,528,549.26	$4,154,220.96	$5,105,688.31	$4,000.00	$2,146,273.35	$52,112,643.74
Total	$4,115,744.77	$56,180,929.99	$4,551,032.05	$5,105,688.31	$4,000.00	$2,146,273.35	$72,103,668.47

The following statement represents the collection of motor license fees by the Secretary of State, and shows the number of vehicles from which the collections were made for the calendar years 1911 to 1924, inclusive:

TABLE XX—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Year of collection.	Number of vehicles.	Fees collected.
1911	38,269	$ 105,344.28
1912	68,012	375,716.22
1913	94,646	507,134.77
1914	131,140	703,403.70
1915	180,832	924,905.74
1916	248,429	1,242,509.65
1917	340,252	1,587,772.69
1918	389,761	2,762,567.53
1919	478,438	3,262,176.57
1920	568.759	5,893,586.02
1921	670,452	6,663,910.22
1922	785,378	7,861,211.21
1923	969,092	9,630,367.77
1924	1,132,641	11,513,957.05
Total 1911 to 1924	----------	$53,034,563.62

NOTE.—This statement represents the collections of motor fees by calendar years of Secretary of State's office and can not be compared with the revenue deposited with the State Treasurer due to the fact that the law requires the Secretary of State to deposit his collections each thirty days following the date of receipt.

The following statement represents the collection of motor license fees by months during the calendar years 1921, 1922, 1923 and 1924:

TABLE XXI—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

	1921	1922	1923	1924
January	$2,897,758.72	$3,252,174.66	$4,014,285.44	$5,542.566.42
February	1,264,773.15	1,471,791.61	1,740,113.23	1,800,877.12
March	994,152.02	966,026.65	1,143,169.52	1,203,696.55
April	519,878.43	589,703.34	814,812.00	1,109,041.92
May	333,460.17	586,177.70	660,851.24	672,716.70
June	224,359.11	322,684.94	381,256.39	335,451.15
July	215,506.11	271,588.96	349,875.26	351,320.94
August	146,948.37	170,736.44	213,537.77	192,873.25
September	99,263.82	115,170.49	131,154.87	137,691.72
October	67,870.65	80,244.66	109,111.62	106,516.39
November	30,341.09	44,282.04	53,007.85	47,113.75
December	8,996.83	11,900.53	19,192.58	14,091.14
Total	$6,803,307.47	$7,882,482.02	$9,630,367.77	$11,513,957.05
Refunds	26,526.30	21,270.81	----------	----------
Total	$6,776,781.17	$7,861,211.21	$9,630,367.77	$11,513,957.05

The following statement represents the collection of motor license fees by counties for the calendar years 1921, 1922, 1923 and 1924:

TABLE XXII—SCHEDULE OF MOTOR FEES BY COUNTIES AS COLLECTED BY SECRETARY OF STATE.

	1921	1922	1923	1924
Cook	$2,013,788.25	$2,335,925.75	$3,230,180.00	$4,146,998.00
Adams	78,597.00	91,174.25	114,990.00	131,363.00
Alexander	14,902.00	17,286.75	21,980.00	28,418.00
Bond	17,307.75	20,077.50	26,995.00	31,215.00
Boone	28,550.50	33,119.25	33,982.00	37,595.00
Brown	14,055.00	16,304.00	16,450.00	17,100.00
Bureau	78,549.75	91,124.75	92,866.00	104,925.00
Calhoun	8,613.81	9,991.50	9,824.00	12,110.00
Carroll	39,976.25	46,373.50	46,841.00	49,942.00
Cass	30,488.75	35,367.50	38,884.00	40,101.00
Champaign	120,484.25	139,764.50	139,863.00	163,098.00
Christian	60,733.50	70,452.00	69,520.00	80,393.00
Clark	28,476.00	33,036.50	39,452.00	44,928.00
Clay	14,014.35	16,257.00	18,898.00	23,818.00
Clinton	21,724.50	25,127.00	31,880.00	35,991.00
Coles	50,798.75	58,928.00	66,590.00	77,512.00
Crawford	43,994.85	51,034.00	52,337.00	56,980.00
Cumberland	13,756.75	15,958.25	16,270.00	21,001.00
DeKalb	69,836.50	81,127.75	81,480.00	90,185.00
DeWitt	35,842.50	41,578.50	40,442.00	44,044.00
Douglas	41,568.75	48,220.75	45,338.00	46,860.00
DuPage	49,280.75	57,166.75	103,110.00	131,091.00
Edgar	48,020.25	55,704.75	54,965.00	60,358.00
Edwards	10,226.25	11,838.00	14,496.00	17,611.00
Effingham	17,077.50	19,810.25	28,730.00	36,984.00
Fayette	21,394.25	24,817.75	26.792.00	32,130.00
Ford	40,091.50	46,507.00	41,961.00	44,050.00
Franklin	35,097.00	40.713.25	85,715.00	105,513.00
Fulton	77,302.75	89,673.00	96,990.00	109,841.00
Gallatin	8,308.25	9,637.75	10,729.00	12,480.00
Greene	26,165.25	30,352.00	32,874.00	37,900.00
Grundy	31,877.75	36,978.75	37,441.00	43,222.00
Hamilton	5,651.75	6,556.50	10,722.00	13,481.00
Hancock	57,236.75	66,395.75	68,388.00	74,585.00
Hardin	2,311.00	2,680.75	3,760.00	5,635.00
Henderson	16.724.50	19,400.50	18,977.00	19,759.00
Henry	94,373.50	109,440.25	110,333.00	118,853.00
Iroquois	84,533.50	98,057.75	86.950.00	92,250.00
Jackson	25,277.50	29,317.75	49,461.00	63,500.00
Jasper	13,560.50	15,703.25	19,615.00	23,867.00
Jefferson	16,812.50	19,503.75	35,570.00	46,914.00
Jersey	12,564.25	14,572.75	16,711.00	19,001.00
JoDaviess	37,922.75	43,990.50	43,855.00	48,196.00
Johnson	5,319.75	6,169.50	9,444.00	12.020.00
Kane	130,819.25	151,751.75	199,250.00	237,250.00
Kankakee	72,911.25	84,577.50	86,966.00	102,070.00
Kendall	23,610.25	27,387.50	24,008.00	26,760.00
Knox	71,983.40	83,500.75	104,340.00	117,583.00
Lake	77,709.35	90,144.50	126,931.00	164,874.00
LaSalle	142,976.50	165,852.00	174,960.00	203,732.00
Lawrence	35,512.40	41,184.75	41,900.00	47,438.00
Lee	61,276.00	71,080.00	72,440.00	81,695.00
Livingston	88,796.10	103,153.50	94,585.00	96,643.00
Logan	58,070.00	67,362.75	64,210.00	65,268.00
Macon	93,173.85	108,078.50	125,455.00	152,421.00
Macoupin	55,982.75	64,940.50	88,980.00	101,125.00
Madison	99,232.15	115,110.50	172,910.00	219,872.00
Marion	28,428.50	32,976.75	60,221.00	69,952.00
Marshall	30,820.75	35,751.75	31,410.00	31,389.00
Mason	34,446.50	39,958.52	40,112.00	43,784.00
Massac	9,053.75	10,500.50	12,920.00	16,587.00
McDonough	52,215.00	60,568.75	61,133.00	68,457.00
McHenry	65,985.50	76,540.22	81,911.00	94,563.00
McLean	140,441.75	162,913.75	160,871.00	176.324.00
Menard	20,221.30	23,456.75	24,955.00	26,839.00
Mercer	45,960.00	53,313.75	50,127.00	51,215.00
Monroe	14,962.50	17,356.50	22,260.00	25,777.00
Montgomery	51,421.60	59,649.75	71,008.00	81,897.00
Morgan	43,317.00	50,246.75	57,004.00	63,690.00
Moultrie	24,829.75	28,802.50	26,980.00	27,829.00
Ogle	62,936.00	73,006.00	73,120.00	80,357.00
Peoria	153,328.50	178,061.25	235,866.00	271,726.00
Perry	16,345.50	18,960.25	33,783.00	40,952.00
Piatt	40,904.50	47,449.25	41,200.00	41,620.00
Pike	25,392.50	29,454.57	41,944.00	47,325.00
Pope	4,025.50	4,668.50	4,895.00	5,766.00

TABLE XXII—Concluded.

	1921	1922	1923	1924
Pulaski	$ 8,043.75	$ 9,330.25	$ 13,700.00	$ 17,252.00
Putnam	9,582.50	11,115.75	12,622.00	13,785.00
Randolph	23,373.00	27,113.25	43,117.00	51,632.00
Richland	17,192.50	19,943.75	21,933.00	27,501.00
Rock Island	119,603.50	138,742.50	156,847.00	189,946.00
Saline	25,040.00	29,043.25	52,670.00	63,669.00
Sangamon	137,482.00	159,487.25	174,911.00	206,024.00
Schuyler	17,160.50	19,903.50	23,574.00	26,913.00
Scott	14,258.00	16,539.00	16,788.00	19,769.00
Shelby	42,517.50	49,320.25	49,311.00	53,446.00
Stark	25,392.50	20,455.00	28,448.00	29,299.00
St. Clair	114,818.75	133,191.50	209,376.00	255,653.00
Stephenson	63,830.50	74,043.75	89,550.00	98,632.00
Tazewell	62,054.00	71,984.00	70,121,00	80,154.00
Union	12,331.75	14,306.50	19,005.00	28,182.00
Vermilion	115,205.25	133,640.00	158,980.00	185,204.00
Wabash	14,718.75	17,073.54	20,441.00	24,423.00
Warren	44,539.75	51,434.75	50,622.00	64,445.00
Washington	19,977.75	23,174.00	27,791.00	32,677.00
Wayne	14,231.25	16,507.50	20,282.00	26,328.00
White	19,394.75	22,496.75	23,612.00	26,513.00
Whiteside	78,427.50	90,977.81	95,887.00	108,669.00
Will	107,350.50	124,527.25	165,282.00	199,882.00
Williamson	43,011.50	49,894.00	97,599.00	116,409.00
Winnebago	135,406.75	157,073.75	175,678.00	209,671.00
Woodford	51,557.51	59,844.55	51,914.77	53,530.25
Total	$6,776,781.17	$7,861,211.21	$9,630,367.77	$11,546,206.25
Less refunds				32,249.20
Total	$6,776,781.17	$7,861,211.21	$9,630,367.77	$11,513,957.05

The following statement represents the allotment of Federal aid funds by the United States Government to Illinois during the years 1917 to 1925, inclusive:

TABLE XXIII—STATEMENT OF FEDERAL AID FUNDS ALLOTED BY THE UNITED STATES GOVERNMENT TO ILLINOIS, 1917 TO 1925, INCLUSIVE.

Year.	Amount.	Year.	Amount.
1917	$ 220,926.23	1921	$3,273,800.93
1918	441,852.46	1922	3,246,281.07
1919	2,185,550.65	1923	2,164,187.38
1919	658,323.48	1924	2,797,888.59
1920	874,220.26	1925	3,203,867.99
1920	3,278,325.97		
1921	1,091,266.98	Total	$23,436,491.99

The following statement represents the revenue derived from the sale of the $60,000,000.00 Bond Issue and shows the weighted average sale rate together with the weighted average yield on all series sold:

TABLE XXIV—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $60,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	94.020	4.83	$5,000,000.00	$4,709,477.78	$4,709,477.78	----------
1922	Apr. 13	98.875	4.19	6,000,000.00	5,940,111.11	5,940,111.11	----------
1922	Sept. 18	99.688	4.04	6,000,000.00	6,083,855.65	6,083,855.65	----------
1923	Feb. 20	98.183	4.15	6,000,000.00	5,908,333.34	5,908,333.34	----------
1923	May 25	97.000	4.40	7,000,000.00	6,837,667.68	6,837,667.68	----------
1923	Oct. 16	94.41	4.68	6,000,000.00	5,687,266.68	5,687,266.68	----------
1923	Dec. 22	94.46	4.50	6,000,000.00	5,678,266.67	5,667,600.00	$10,666.67
1924	June 3	96.525	4.29	9,000,000.00	8,704,200.00	8,704,200.00	----------
1924	Aug. 15	99.109	4.08	9,000,000.00	8,947,800.00	8,919,800.00	28,000.00
Total	--------	97.4949	4.32	$60,000,000.00	$58,496,978.91	$58,458,312.24	$38,666.67

NOTE.—The figure of 4.32 shown under interest yield represents the weighted average yield of all series sold.

The figure of 97.4949 shown in the sale rate column represents the average sale rate on all series sold.

The following statement represents the appropriations made by the General Assembly of the $60,000,000.00 Bond Issue Fund:

TABLE XXV—APPROPRIATIONS PAYABLE FROM $60,000,000.00 BOND ISSUE BUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922	----------	----------	----------
1923	30,000,000.00	----------	30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

The following statement represents the annual expenditures which have been made from the $60,000,000.00 Bond Issue Fund from 1921 to 1924, inclusive:

TABLE XXVI—EXPENDITURES FROM $60,000,000.00 BOND ISSUE FUND 1921 TO 1924.

Year.	Construction.	Refunds to counties.	Total.
1921	$ 2,461,000.65	$ 8,000.00	$ 2,469,000.65
1922	12,420,711.49	637,820.93	13,058,532.42
1923	18,607,057.40	605,182.71	19,212,240.11
1924	23,718,539.06	----------	23,718,539.06
Total	$57,207,308.60	$1,251,003.64	$58,458,312.24

The following statement shows a comparison of estimated motor fee revenue during the next twenty years, with the amounts required to retire the principal and pay the interest on the $60,000,000.00 Bond Issue, showing the surplus remaining for the payment of interest and the retirement of principal on the $100,000,000.00 Bond Issue plus the amounts required for maintenance:

TABLE XXVII—COMPARISON OF ESTIMATED MOTOR FEE REVENUE WITH AMOUNTS REQUIRED TO RETIRE PRINCIPAL AND PAY INTEREST ON $60,000,000.00 IN HIGHWAY BONDS.

Year.	Estimated motor fee revenue.	Total payable all bond series each year.	Surplus for additional bonds, maintenance, etc.
1924	$10,750,000.00	$1,380,000.00	$9,370,000.00
1925	11,500,000.00	2,160,000.00	9,340,000.00
1926	11,600,000.00	4,400,000.00	7,200,000.00
1927	11,800,000.00	4,320,000.00	7,480,000.00
1928	12,000,000.00	4,240,000.00	7,760,000.00
1929	12,100,000.00	4,160,000.00	7,940,000.00
1930	12,200,000.00	4,080,000.00	8,120,000.00
1931	12,300,000.00	4,000,000.00	8,300,000.00
1932	12,500,000.00	3,920,000.00	8,580,000.00
1933	12,660,000.00	3,840,000.00	8,820,000.00
1934	12,800,000.00	3,760,000.00	9,040,000.00
1935	12,950,000.00	4,680,000.00	8,270,000.00
1936	13,000,000.00	4,560,000.00	8,440,000.00
1937	13,250,000.00	4,440,000.00	8,810,000.00
1938	13,360,000.00	5,320,000.00	8,040,000.00
1939	13,500,000.00	5,160,000.00	8,340,000.00
1940	13,660,000.00	6,000,000.00	7,660,000.00
1941	13,800,000.00	5,800,000.00	8,000,000.00
1942	13,950,000.00	5,600,000.00	8,350,000.00
1943	14,100,000.00	5,400,000.00	8,700,000.00
1944	14,240,000.00	5,200,000.00	9,040,000.00
Total	$268,020,000.00	$92,420,000.00	$175,600,000.00

The following statement represents the arrangement of the retirement of the principal and interest payments on the $60,000,000.00 Bond Issue. These estimates of motor fee revenue are the ultra conservative figures prepared when the General Assembly was considering the authorization of additional State bonds. These figures will be exceeded by actual collections:

TABLE XXVIII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $60,000,000.00—4% BONDS.

Total bond voted November 4, 1918	$60,000,000.00
Total bonds authorized for sale	60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each year
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		2,160,000.00	2,160,000.00	4,320,000.00
1926	$2,000,000.00	2,400,000.00	4,400,000.00	8,720,000.00
1927	2,000,000.00	2,320,000.00	4,320,000.00	13,040,000.00
1928	2,000,000.00	2,240,000.00	4,240,000.00	17,280,000.00
1929	2,000,000.00	2,160,000.00	4,160,000.00	21,440,000.00
1930	2,000,000.00	2,080,000.00	4,080,000.00	25,520,000.00
1931	2,000,000.00	2,000,000.00	4,000,000.00	29,520,000.00
1932	2,000,000.00	1,920,000.00	3,920,000.00	33,440,000.00
1933	2,000,000.00	1,840,000.00	3,840,000.00	37,280,000.00
1934	2,000,000.00	1,760,000.00	3,760,000.00	41,040,000.00
1935	3,000,000.00	1,680,000.00	4,680,000.00	45,720,000.00
1936	3,000,000.00	1,560,000.00	4,560,000.00	50,280,000.00
1937	3,000,000.00	1,440,000.00	4,440,000.00	54,720,000.00
1938	4,000,000.00	1,320,000.00	5,320,000.00	60,040,000.00
1939	4,000,000.00	1,160,000.00	5,160,000.00	65,200,000.00
1940	5,000,000.00	1,000,000.00	6,000,000.00	71,200,000.00
1941	5,000,000.00	800,000.00	5,800,000.00	77,000,000.00
1942	5,000,000.00	600,000.00	5,600,000.00	82,600,000.00
1943	5,000,000.00	400,000.00	5,400,000.00	88,000,000.00
1944	5,000,000.00	200,000.00	5,200,000.00	93,200,000.00
Total	$60,000,000.00	$33,200,000.00	$93,200,000.00	$93,200,000.00

TABLE XXVIII—Continued.

SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sale—October 25, 1921. Date of issue—November 1, 1921. Rate $94.020. Yield 4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$ 100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE XXVIII—Continued.

SERIES NO. 2—$6,000,000.00—4% BONDS.

Date of sale—April 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE XXVIII—Continued.

SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue—May 1, 1922. Rate $99.688. Yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$ 240,000.00	$ 240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE XXVIII—Continued.

SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—March 1, 1923. Rate $98.183. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$240,000.00	$240,000.00	$ 240,000.00
1925		240,000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1933		240,000.00	240,000.00	2,400,000.00
1934		240,000.00	240,000.00	2,640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120,000.00
1937		240,000.00	240,000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000,000.00	160,000.00	1,160,000.00	6,960,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	9,160,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE XXVIII—Continued.

SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Yield 4.40

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	$500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220,000.00	720,000.00	3,560,000.00
1930	500,000.00	200,000.00	700,000.00	4,260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600,000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1,000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40,000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE XXVIII—Continued.

SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16, 1923. Date of issue—Oct. 1, 1923. Rate $94.41. Yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable at May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580,000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE XXVIII—Continued.

SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1929		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

TABLE XXVIII—Continued.

SERIES NO. 8—$9,000,000.00—4% BONDS.

Date of sale—June 3, 1924. Date of issue—June 1, 1924. Rate 96.525. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$270,000.00	$ 270,000.00	$ 270,000.00
1926		360,000.00	360,000.00	630,000.00
1927		360,000.00	360,000.00	990,000.00
1928		360,000.00	360,000.00	1,360,000.00
1929		360,000.00	360,000.00	1,710,000.00
1930		360,000.00	360,000.00	2,070,000.00
1931		360,000.00	360,000.00	2,430,000.00
1932		360,000.00	360,000.00	2,790,000.00
1933		360,000.00	360,000.00	3,150,000.00
1934		360,000.00	360,000.00	3,510,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,370,000.00
1936	500,000.00	340,000.00	840,000.00	5,210,000.00
1937		320,000.00	320,000.00	5,530,000.00
1938		320,000.00	320,000.00	5,850,000.00
1939		320,000.00	320,000.00	6,170,000.00
1940	1,000,000.00	320,000.00	1,320,000.00	7,490,000.00
1941	1,000,000.00	280,000.00	1,280,000.00	8,770,000.00
1942	2,000,000.00	240,000.00	2,240,000.00	11,010,000.00
1943	2,000,000.00	160,000.00	2,160,000.00	13,170,000.00
1944	2,000,000.00	80,000.00	2,080,000.00	15,250,000.00
Total	$9,000,000.00	$6,250,000.00	$15,250,000.00	$15,250,000.00

TABLE XXVIII—Concluded.

SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—Aug. 15, 1924. Date of issue—Aug. 1, 1924. Rate 99.109. Yield 4.08.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$210,000.00	$ 210,000.00	$ 210,000.00
1926		360,000.00	360,000.00	570,000.00
1927		360,000.00	360,000.00	930,000.00
1928		360,000.00	360,000.00	1,290,000.00
1929		360,000.00	360,000.00	1,650,000.00
1930		360,000.00	360,000.00	2,010,000.00
1931		360,000.00	360,000.00	2,370,000.00
1932		360,000.00	360,000.00	2,730,000.00
1933		360,000.00	360,000.00	3,090,000.00
1934		360,000.00	360,000.00	3,450,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,310,000.00
1936	500,000.00	340,000.00	840,000.00	5,150,000.00
1937		320,000.00	320,000.00	5,470,000.00
1938	1,000,000.00	320,000.00	1,320,000.00	6,790,000.00
1939	1,000,000.00	280,000.00	1,280,000.00	8,070,000.00
1940	1,000,000.00	240,000.00	1,240,000.00	9,310,000.00
1941	1,000,000.00	200,000.00	1,200,000.00	10,510,000.00
1942		160,000.00	160,000.00	10,670,000.00
1943	1,000,000.00	160,000.00	1,160,000.00	11,830,000.00
1944	3,000,000.00	120,000.00	3,120,000.00	14,950,000.00
Total	$9,000,000.00	$5,950,000.00	$14,950,000.00	$14,950,000.00

The following statement represents the revenue derived from the sale of $4,000,000.00 of the $100,000,000.00 Bond Issue:

TABLE XXIX—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $100,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1924	Dec. 30	97.5575	4.29	$4,000,000.00	$3,913,411.20	$3,902,300.00	$11,111.20

The following statement shows the arrangement for the retirement of principal and payment of interest on series No. 1, $4,000,000.00, 4% bonds sold December 30, 1924, of the $100,000,000.00 Bond Issue:

TABLE XXX—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS.

SERIES NO. 1—$4,000,000.00—4% BONDS.

Date of sale—Dec. 30, 1924. Date of issue—Jan. 1, 1925. Rate $97.5575. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925		$53,333.33	$80,000.00	$133,333.33	$133,333.33
1926		80,000.00	80,000.00	160,000.00	160,000.00
1927		80,000.00	80,000.00	160,000.00	160,000.00
1928		80,000.00	80,000.00	160,000.00	160,000.00
1929		80,000.00	80,000.00	160,000.00	160,000.00
1930		80,000.00	80,000.00	160,000.00	160,000.00
1931		80,000.00	80,000.00	160,000.00	160,000.00
1932	$500,000.00	80,000.00	70.000.00	150,000.00	650,000.00
1933	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1934	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1935	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1936	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1937	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1938	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1930	500,000.00	10,000.00		10,000.00	510,000.00
Total	$4,000,000.00	$893,333.33	$840,000.00	$1,733,333.33	$5,733,333.33

The following statement represents the appropriations payable from the $100,000,000.00 Bond Issue:

TABLE XXXI—APPROPRIATIONS PAYABLE FROM $100,000,000.00 BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1923	$100,000,000.00		$100,000,000.00
Total	$100,000,000.00		$100,000,000.00

The following statement represents the expenditures which have been made during the calendar year 1924 from the sale of the first series of the $100,000,000.00 Bond Issue:

TABLE XXXII—EXPENDITURES FROM $100,000,000.00 BOND ISSUE FUND—1924.

Year.	Construction.	Refunds to counties.	Total.
1924			

The following statement is a comparison of total expenditures from the Road and Bond Road Funds combined during the calendar years 1914 to 1924, inclusive:

TABLE XXXIII—TOTAL ANNUAL EXPENDITURES FROM THE ROAD AND BOND ROAD FUNDS BY THE DIVISION OF HIGHWAYS FOR THE YEARS 1914 TO 1924 INCLUSIVE.

Year.	Administration and engineering.	Construction.	Maintenance.	County refunds.	Equipment.	Total.	Per cent.
1914		$ 364,202.39				$ 364,202.39	.28
1915	$ 23,041.35	629,603.38	$ 9,871.50			662,516.23	.52
1916	3,920.88	656,641.05	20,686.43			681,248.36	.53
1917	113,467.75	992,567.04	35,532.26			1,141,567.05	.89
1918	21,896.36	524,802.84	37,303.98			584,003.18	.45
1919	501,811.85	4,323,274.23	84,614.37		$ 66,287.44	4,975,987.89	3.88
1920	813,942.05	10,318,517.96	208,802.55		240,237.07	11,581,499.63	9.02
1921	922,291.64	13,273,258.94	358,657.85	$ 727,273.18	308,557.17	15,596,038.78	12.14
1922	1,337,751.29	17,573,666.06	640,503.01	2,436,005.43	379,666.19	22,367,591.98	17.42
1923	1,935,199.05	25,612,478.20	1,110,209.41	2,016,520.20	319,570.11	30,993,976.97	24.14
1924	2,368,147.45	33,442,772.33	2,044,869.69	1,176,893.14	429,661.98	39,462,335.59	30 73
Total	$8,041,469.67	$107,717,784.42	$4,551,042.05	$6,356,691.95	$1,743,979.96	$128,410,968.05	
Per cent	6.26	83.89	3.54	4.95	1.36		100.00

The following statement shows a comparison of the amounts spent each month from all funds during the calendar years 1921, 1922, 1923 and 1924:

TABLE XXXIV—COMPARISON OF TOTAL EXPENDITURES ALL FUNDS WITH RATIOS.

	1921	Monthly per cent of total.	1922	Monthly per cent of total.	1923	Monthly per cent of total.	1924	Monthly per cent of total.	Total.	Monthly per cent of total.
January	$ 790,619.34	5.04	$ 771,740.43	3.44	$ 752,978.66	2.43	$1,418,700.91	3.60	$ 3,734,039.34	3.44
February	594,405.38	3.79	415,476.44	1.85	1,163,351.98	3.75	1,837,899.83	4.66	4,011,133.63	3.69
March	703,592.41	4.48	1,016,990.06	4.53	1,890,509.12	6.09	1,931,498.05	4.89	5,542,589.64	5.10
April	648,326.61	4.13	847,449.13	3.77	1,668,267.59	5.37	2,746,372.08	6.96	5,910,415.41	5.44
May	1,141,060.22	7.27	1,623,975.48	7.23	2,493,564.15	8.03	3,847,583.60	9.75	9,106,183.45	8.38
June	1,879,929.53	11.98	2,724,384.23	12.13	3,419,818.32	11.02	4,181,769.51	10.60	12,205,901.59	11.23
July	1,650,383.40	10.52	3,485,829.92	15.52	3,832,940.41	12.35	4,866,445.69	12.33	13,835,599.42	12.73
August	2,067,640.53	13.17	3,267,294.76	14.55	4,115,100.96	13.26	4,919,209.17	12.47	14,369,245.42	13.22
September	1,908,665.78	12.16	2,411,038.51	10.74	3,972,466.54	12.80	5,218,135.58	13.22	13,510,306.41	12.44
October	1,995,648.22	12.72	2,389,549.29	10.64	1,881,532.49	6.06	4,645,517.55	11.77	10,912,247.55	10.04
November	1,264,658.68	8.06	2,162,187.90	9.63	3,761,878.20	12.12	3,006,654.78	7.61	10,195,379.56	9.38
December	1,049,918.87	6.68	1,337,744.36	5.97	2,089,460.87	6.72	842,548.84	2.14	5,319,672.94	4.91
Total	$15,694,848.97	100.00	$22,453,660.51	100.00	$31,041,869.31	100.00	$39,462,335.59	100.00	$108,652,714.38	100.00

PERMITS, FRANCHISES, LEASES AND RENTALS.

Any requests for permits or franchises for the use of the State Highways for various purposes are carefully investigated as to their desirability and legal aspects before being finally approved by the Chief Highway Engineer and the Director of the Department of Public Works anr Buildings.

Arrangements are also made for the renting or leasing of ground or buildings used by the various sections of the division.

CLAIMS, LIENS AND ASSIGNMENTS.

All liens, claims or assignments filed against contractors engaged in State highway construction are received, recorded and filed. A detailed record of claims is kept against each contractor and for each section of work under contract.

REFUNDS TO COUNTIES.

The following represents a statement showing the amounts appropriated, refunded and lapsed under House Bill No. 766, Refunds to Counties:

TABLE XXXV—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 766.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bond	$114,837.53	$114,837.53	
Boone	3,937.34		$ 3,937.34
Bureau	6,836.42		6,836.42
Cass	5,851.17		5,851.17
Champaign	74,453.33	22,629.13	51,824.20
Clark	126,259.34	126,258.68	66
Clinton	6,745.00		6,745.00
Coles	36,876.16		36,876.16
Cook	687,935.42	498,954.97	188,980.45
Crawford	10,014.12		10,014.12
Cumberland	94,209.05	92,312.41	1,896.64
DeKalb	51,509.00	51,509.00	
Douglas	8,993.93		8,993.93
DuPage	82,042.00	82,042.00	
Edgar	1,577.20		1,577.20
Edwards	1,498.69		1,498.69
Effingham	106,181.45	98,590.35	7,591.10
Fayette	160,526.53	147,258.26	13,268.27
Fulton	28,585.10		28,585.10
Iroquois	65,788.51	65,788.39	12
Jasper	3,350.74		3,350.74
Jefferson	4,168.35		4,168.35
Kane	113,639.55	113,639.55	
Kankakee	13,239.47	13,239.47	
Lake	143,681.62	143,681.62	
Lawrence	6,373.44		6,373.44
Lee	75,726.00	75,708.81	17.19
Livingston	13,119.87		13,119.87
Logan	3,058.65		3,058.65
Macoupin	73,176.31	17,495.88	55,680.43
Madison	206,032.34	174,200.20	31,832.14
Mason	55,882.46		55,882.46
Menard	51,117.01		51,117.01
Mercer	3,870.00		3,870.00
Monroe	7,035.04		7,035.04
Morgan	7,966.07		7,966.07

TABLE XXXV—Concluded.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Ogle	47,815.63	12,597.86	35,218.77
Peoria	69,286.00	69,043.80	241.20
Piatt	21,027.69		21,027.69
Rock Island	4,650.54		4,650.54
St. Clair	84,210.92	84,210.92	
Sangamon	131,067.24	123,457.62	7,609.62
Schuyler	14,033.49		14,033.49
Stephenson	20,571.79		20,571.79
Tazewell	145,468.89	132,835.12	12,633.77
Vermilion	651,044.41	544,156.60	106,887.81
Warren	41,142.06	31,470.74	9,671.32
Whiteside	75,460.88	73,622.25	1,838.63
Will	21,521.00	16,600.68	4,920.32
Williamson	62,392.88		62,392.88
Winnebago	43,594.60	43,594.60	
Total	$3,889,382.23	$2,969,736.44	$919,645.79

The following represents a statement of the amounts appropriated, refunded and lapsed under House Bill No. 867, Refunds to Counties:

TABLE XXXVI—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 867.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed October 1, 1923.
Bureau	$ 6,055.66		$ 6,055.66
Carroll	15,090.56		15,090.56
Clinton	6,745.00		6,745.00
Coles	7,869.21		7,869.21
Cook	492,675.23	$ 18,268.01	474,407.22
DeKalb	60,841.26	3,450.76	57,390.50
Edgar	15,298.92		15,298.92
Franklin	10,493.36		10,493.36
Fulton	8,030.00		8,030.00
Grundy	75,252.00	50,000.00	25,252.00
Jackson	5,909.92		5,909.92
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	84,480.35	72,448.07	12,032.28
Kankakee	62,881.21	62,881.21	
Lake	388,961.15	337,156.27	51,804.88
LaSalle	114,736.57		114,736.57
Lawrence	19,757.21		19,757.21
Lee	25,004.86		25,004.86
Livingston	13,912.26		13,912.26
McHenry	10,647.17		10,647.17
Macoupin	127,876.00		127,876.00
Madison	389,115.77	234,129.24	154,986.53
Marshall	4,307.27		4,307.27
Menard	58,894.30	25,000.00	33,894.30
Ogle	26,288.20		26,288.20
Peoria	170,329.32		170,329.32
Rock Island	15,558.05		15,558.05
St. Clair	133,153.61	118,506.05	14,647.56
Sangamon	164,639.00	156,009.58	8,629.42
Shelby	18,573.03		18,573.03
Whiteside	4,732.04		4,732.04
Will	183,290.57	165,712.27	17,578.30
Winnebago	124,196.40	70,323.39	53,873.01
Total	$2,869,289.87	$1,313,884.85	$1,555,405.02

The following represents a statement of the amounts appropriated, refunded, and balances remaining due the various counties at December 31, 1924, under House Bill No. 822, Refunds to Counties:

TABLE XXXVII—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 822.

County.	Amount appropriated.	Amounts refunded.	Appropriation balance January 31, 1925.
Adams	$ 16,256.06		$ 16,256.06
Bond	4,438.92	$ 4,438.92	
Boone	3,762.32	3,762.32	
Bureau	12,894.26	12,854.54	39.72
Carroll	10,024.77		10,024.77
Cass	5,851.17		5,851.17
Champaign	51,746.58	34,233.92	17,512.66
Coles	33,738.22	32,480.92	1.257.30
Cook	984,393.21	704,959.92	279,433.29
Cumberland	6,261.78		6,261.78
DeKalb	58,192.39		58,192.39
DuPage	45.207.17	32,890.75	12,316.42
Edgar	16.876.12	14,148.08	2,728.04
Edwards	1,498.69		1,498.69
Effingham	5,656.37	3,918.26	1,738.11
Ford	5,738.29		5,738.29
Fulton	33,123.80		33,123.80
Grundy	55,734.87	30,734.87	25,000.00
Iroquois	18,843.00		18,843.00
Jersey	2,930.72		2,930.72
Kane	393,922.37	165,972.21	227,950.16
Kankakee	21,044.78	17,968.30	3,076.48
LaSalle	27,281.15		27,281.15
Lake	214,144.81	42,800.00	171,344.81
Lee	25,004.86		25,004.86
Livingston	19,160.77		19,160.77
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Macoupin	162,902.24	162,406.36	495.88
Madison	302,991.28	172,847.39	130,143.89
Marion	1,593.66		1,593.66
Marshall	45,601.86		45,601.86
Mason	54,066.22		54,066.22
McHenry	10,191.63		10,191.63
Menard	44,773.74	26,242.44	18,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.04		7,035.04
Morgan	7,966.07		7,966.07
Ogle	78,613.10	64,767.39	13,845.71
Peoria	122,739.77	80,818.16	41,921.61
Piatt	11,235.62	11,235.62	
Pike	8,325.16		8,325.16
Putnam	19,073.92		19,073.92
Rock Island	3,029.82		3,029.82
Schuyler	17,583.40		17,583.40
Shelby	17,366.56		17,366.56
St. Clair	483,564.11	284,904.02	198,660.09
Stephenson	12,838.53		12,838.53
Tazewell	12,633.48		12,633.48
Vermilion	155,526.79		155,526.79
Warren	38,405.66		38,405.66
Whiteside	4,732.04	4,732.04	
Will	194,128.06	100,340.09	93,787.97
Williamson	66,863.40	15,000.00	51,863.40
Winnebago	61,468.68	61,468.68	
Total	$4,025,632.56	$2,085,925.20	$1,939,707.36

DISTRIBUTION OF CEMENT TO STATE CONTRACTS.

During the year 1924 the State contracted for approximately 4,000,000 barrels of cement on which 3,508,967 barrels were delivered to 703 road and bridge contracts in the State.

The payment of all cement furnished for State road work is handled in this Bureau where a record and follow up system for final disposition of cars is kept and a final check is made with the laboratory and district engineer on shipments and transfers to and from the various construction sections.

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EIGHTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

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January 1, 1925

TO

December 31, 1925

AUG. 26TH 1818

CORNELIUS R. MILLER, Director
FRANK T. SHEETS, Chief Highway Engineer

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EIGHTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

DIVISION OF HIGHWAYS

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Springfield, Illinois
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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS.

CORNELIUS R. MILLER, *Director.*
DON GARRISON, *Assistant Director.*

DIVISION OF HIGHWAYS.

FRANK T. SHEETS, *Chief Highway Engineer and Acting Superintendent of Highways.*

R. R. BENEDICT, *Assistant Chief Highway Engineer.*

BUREAU CHIEFS.

H. E. SURMAN, *Engineer of Design.*
G. F. BURCH, *Engineer of Bridges.*
V. L. GLOVER, *Engineer of Roads.*
C. M. HATHAWAY, *Engineer of Construction.*
FRED TARRANT, *Engineer of Maintenance.*
H. F. CLEMMER, *Engineer of Materials.*
D. H. CORNELL, *Superintendent of Machinery.*
J. M. MCCOY, *Chief Clerk.*

DISTRICT ENGINEERS.

District No. 1—G. N. LAMB, Elgin, Ill.
District No. 2—O. F. GOEKE, Dixon, Ill.
District No. 3—M. J. FLEMING, Ottawa, Ill.
District No. 4—THEO. PLACK, Peoria, Ill.
District No. 5—CHAS. H. APPLE, Paris, Ill.
District No. 6—K. N. EVANS, Springfield, Ill.
District No. 7—P. F. JERVIS, Effingham, Ill.
District No. 8—C. M. SLAYMAKER, E. St. Louis, Ill.
District No. 9—L. SCHWARTZ, Carbondale, Ill.

CONTENTS.

PAGE.
I. GENERAL 1
  1. The Division 1
  2. Organization 1
  3. Highway Development 1
  4. Work Accomplished During 1925 1
  5. Detailed Report by Bureaus 4

II. BUREAU OF DESIGN 5
  A. ROAD SECTION 5
    1. Surveys and Plans 5
    2. Contracts Awarded 5
    3. Unit Prices 6
    4. Responsibility of Bidders 7
    5. Changes in Design 10
    6. Pavement Cross Sections 11
    7. Revisions in Specifications 11
    8. Federal Aid 14
    9. State Aid 17
    10. City Widening 19
    11. House Bill 433 19
    12. House Bill 536 19
    13. Refunds to Counties 20
    14. Grade Separations 20
    15. Right of Way 20
    16. Special Reports, Maps, etc 23
  B. BRIDGE SECTION 23
    1. Selection of Bridge Types 23
    2. County and State Bridge Program 24
    3. Complete Bridge Program for 1925 25
    4. Special Bridge Work 25
    5. Concrete Bridge Costs 25
    6. Description of Bridge Photographs 25

III. BUREAU OF CONSTRUCTION 29
  1. Construction Program, 1925 29
  2. Cost of 18-Foot Concrete Pavement 32
  3. Weather and Labor Conditions, 1925 32
  4. Construction Accomplishments, 1925 33
  5. Construction Policies, 1925 33
  6. Illinois Contracting Organization 33
  7. Material Resources 35
  8. Day Labor Construction 35
  9. Penitentiary Stone 36
  10. Rate Schedule Survey 36

IV. BUREAU OF MAINTENANCE 42
  1. Organization and Duties 42
  2. Outline of Activities, 1925 44
  3. Permits and Franchises 44
  4. Cost Accounting 46
  5. Snow Removal 48
  6. Maintenance of Surfaced Roads 50
  7. Maintenance of Detours, Unpaved and Temporary Routes 52
  8. Construction of Additions and Betterments 59
  9. Reconstruction 59
  10. Policing of the State Highway System 60

V. BUREAU OF MATERIALS 61
  1. General 61
  2. Inspection 61
  3. Investigations 64
  4. Departmental Service 67

VI. BUREAU OF MACHINERY 67
  1. Mechanical and Electrical Supplies 67
  2. Repair Parts and Storage Room 71
  3. Rental of Surplus War Material 71
  4. Disposition of Trucks and Passenger Cars 71
  5. Traveling Inspectors 71

PAGE.
VII. BUREAU OF AUDITS 71
  1. Accounting and Auditing 71
  2. Reports and Financial Estimates 72
  3. Permits, Franchises, Leases and Rentals 93
  4. Claims, Liens and Assignments 93
  5. Refunds to Counties 93
  6. Distribution of Cement to State Contracts 96

ILLUSTRATIONS.

FIG. PAGE.

1. As Illinois looked January 1, 1921 2
2. As Illinois looked December 31, 1925 3
3. Chart showing Roads Built in Illinois 4
4. Graphs showing Unit Price Range on Principal Items in Highway Construction during 1925 8
5. Graphs showing Unit Price Range on Principal Items in Highway Construction, 1919 to 1925 9
6. Typical Cross Sections in Use, January 1, 1925, to December 31, 1925 12
7. Typical Cross Sections in Use, January 1, 1925, to December 31, 1925 13
8. Curve showing average cost of concrete bridge work from 1907 to 1925 26
9. DesPlaines River Bridge at Lyons, on State Bond Issue Route 4 27
10. First Avenue Bridge across Rock River at Sterling 27
11. DesPlaines River Bridge at Summit, on State Bond Issue Route 46 28
12. Blackhawk Bridge over Kishwaukee River in Cherry Valley Township, Winnebago County 28
13. A construction view of the bridge across the Kaskaskia River at Evansville, on State Bond Issue Route 3 29
14. Curves showing Weekly Progress in Pavement Construction in 1925 30
15. Curves showing Progress of Pavement Construction in 1925 in comparison with Previous Years 31
16. Cost Analysis Diagram of 18-foot Concrete Pavement 33
17. Comparative Curves showing Monthly Cement Shipments from 1922 to 1925 34
18. Comparative Curves showing Accumulative Total of Cement Shipments from 1922 to 1925 34
19. Comparison of Production of Penitentiary Stone at Joliet and Menard Quarries and Ratio of Requisitions to Shipments 35
20. Snow Removal on Bond Route 18, in Naperville, DuPage County 36
21. Bond Route 19 near Crystal Lake, McHenry County 37
22. Bond Route 21 north of Gray's Lake, Lake County 37
23. Applying Calcium Chloride as a Curing Agent on Bond Route 19, South of Harvard, McHenry County 38
24. Before Construction: Bond Route 9, north of Ellsworth, McLean County 38
25. After Construction: Bond Route 9, north of Ellsworth, McLean County .. 39
26. Before Construction: Bond Route 31, near Ripley, Brown County 39
27. After Construction: Bond Route 31, near Ripley, Brown County 40
28. Before Construction: Bond Route 36, South of Ursa, Adams County 40
29. After Construction: Bond Route 36, South of Ursa, Adams County 41
30. Before Construction: A Relocation on Bond Route 36, West of Pittsfield, Pike County 41
31. After Construction: A Relocation on Bond Route 36, West of Pittsfield, Pike County 42
32. Chart Showing the Organization of the Bureau of Maintenance 43
33. Chart Showing the Miles of Road Maintained by the Bureau of Maintenance by Districts, 1925 45
34. Chart Showing Division of Costs of the Bureau of Maintenance according to activities, 1925 46
35. Chart showing source of Expenditures and Total Cost of the Bureau of Maintenance, 1925 47
36. Chart Showing Division of Mileage of Surfaced Roads by Types Maintained, 1925 50
37. Chart Showing Division of Costs of the Bureau of Maintenance by Classified Work on Surfaced Roads, 1925 51
38. Chart Showing Division of Costs of Highway Patrol Officers, 1925 60
39. Chart Showing the Main Items of work carried on by the Bureau of Materials 62
40. Chart Showing Quantities of Material and Unit Costs of Inspection for 1925 63
41. Chart Showing Relative Proportion of Various Activities of Bureau of Materials by Distribution of Expense, 1925 66

TABLES.

No.		Page.
I.	Federal Aid and State Bond Issue Contracts Awarded	5
II.	Straight State Aid Contracts Awarded	5
III.	15d Contracts Awarded	6
IV.	Contracts Awarded for County 15d work, 1925	7
V.	Federal Aid Allotments	14
VI.	Status of Federal Aid Funds, January 1, 1926	15
VII.	Status of State Aid Mileage	17
VIII.	Grade Separation Cases Settled, January 1, 1919, to January 1, 1926	21
IX.	A Summary of the County and State Bridge Work carried on from 1906 to 1925	25
X.	Bridge Work carried on from January 1, 1925, to December 31, 1925, classified according to the funds used	25
XI.	Summary of Miles Constructed During 1925	32
XII.	General Summary of 1925 Construction	32
XIII.	Trial Balance—Bureau of Maintenance, 1925	48
XIV.	Statement showing Cost of Snow Removal, 1925	49
XV.	Cost of Maintenance and Upkeep—Concrete Roads, 1925	53
XVI.	Cost of Maintenance—Bit. Concrete Roads, 1925	54
XVII.	Cost of Maintenance—Brick Roads, 1925	55
XVIII.	Cost of Maintenance—Bit. Macadam Roads, 1925	56
XIX.	Cost of Maintenance—W. B. Macadam Roads, 1925	57
XX.	Cost of Maintenance—Gravel Roads, 1925	58
XXI.	Amount Expended for Additions and Betterments, 1925	59
XXII.	Highway Patrol Work for 1925	61
XXIII.	Disposition of Government Trucks, December 31, 1925	68
XXIV.	Disposition of Passenger Cars, December 31, 1925	69
XXV.	Disposition of Miscellaneous Government Equipment, December 31, 1925	70
XXVI.	Statement showing Collections of the Division of Highways and Sources from which collected from January 1, 1925, to December 31, 1925	72
XXVII.	Revenue deposited in Road Funds from 1911 to 1925, inclusive	73
XXVIII.	List of Appropriations payable from the Road Fund by the General Assembly for the years 1913 to 1925, inclusive	74
XXIX.	List of Expenditures by Appropriations payable from the Road Fund for the years 1914 to 1925, inclusive	75
XXX.	Statement showing Expenditures from the Road Fund for the Years 1914 to 1925, inclusive	76
XXXI.	Statement showing Motor Fee Receipts and Registration of Motor Vehicles for the Years 1911 to 1925, inclusive	77
XXXII.	Statement showing Motor Fee Receipts by Months for the Years 1922, 1923, 1924 and 1925	77
XXXIII.	Statement showing Motor Fees Collected by Counties for the Years 1921, 1922, 1923 and 1924	78
XXXIV.	Statement showing Federal Aid Funds Allotted to Illinois by the U. S. Government, 1917 to 1925, inclusive	79
XXXV.	Statement showing Bond Fund Revenue Deposited with the State Treasurer as derived from the sale of $60,000,000 Bond Issue	80
XXXVI.	Statement showing Appropriations Payable from the $60,000,000 Bond Issue Funds	80
XXXVII.	Statement Showing Expenditures from $60,000,000 Bond Issue Fund	80
XXXVIII.	Statement showing Highway Bond Retirement and Interest Calculations on All Series of the $60,000,000 and $100,000,000 Bond Issues, December 31, 1925	81

No.		Page.
XXXIX.	Statement showing Highway Bond Retirement and Interest Calculations, showing the Amount Due at each Retirement and Interest Paying Period on the Entire $60,000,000 Bond Issue plus $24,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1925	82
XL.	Statement showing the Amount of Principal to be Retired and Interest Paid on All Series of the $60,000,000 Bond Issue	83
XLI.	Statement showing the Retirement and Interest Payments of Series No. 1, $5,000,000 Bonds of the $60,000,000 Bond Issue Sold October 25, 1921	83
XLII.	Statement showing the Retirement and Interest Payments of Series No. 2, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold April 13, 1922	84
XLIII.	Statement showing the Retirement and Interest Payments of Series No. 3, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold September 18, 1922	84
XLIV.	Statement showing the Retirement and Interest payments of Series No. 4, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold February 20, 1923	85
XLV.	Statement showing the Retirement and Interest Payments of Series No. 5, $7,000,000 Bonds of the $60,000,000 Bond Issue Sold May 25, 1923	85
XLVI.	Statement showing the Retirement and Interest Payments of Series No. 6, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold October 16, 1923	86
XLVII.	Statement showing the Retirement and Interest Payments of Series No. 7, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold December 22, 1923	86
XLVIII.	Statement showing the Retirement and Interest Payments of Series No. 8, $9,000,000 Bonds of the $60,000,000 Bond Issue Sold June 3, 1924	87
XLIX.	Statement showing the Retirement and Interest Payments of Series No. 9, $9,000,000 Bonds of the $60,000,000 Bond Issue Sold August 15, 1924	87
L.	Statement showing Highway Bond Retirement and Interest Calculations on All Series of $24,000,000 of the $100,000,000 Bond Issue, 4% Bonds Sold to December 31, 1925	88
LI.	Statement showing the Bond Fund Revenue derived from the Sale of $24,000,000 of the $100,000,000 Bond Issue	89
LII.	Statement showing the Retirement and Interest Payments of Series No. 1, $4,000,000 Bonds of the $100,000,000 Bond Issue Sold December 30, 1924	89
LIII.	Statement showing the Retirement and Interest Payments of Series No. 2, $10,000,000 Bonds of the $100,000,000 Bond Issue Sold May 20, 1925	90
LIV.	Statement showing the Retirement and Interest Payments of Series No. 3, $10,000,000 Bonds of the $100,000,000 Bond Issue Sold September 1, 1925	91
LV.	Statement showing the Appropriations Payable from the $100,000,000 Bond Issue	91
LVI.	Statement showing the Expenditures from the $100,000,000 Bond Issue Fund for the Calendar Year 1925	91
LVII.	Statement showing a Comparison of the Amounts Spent each Month from All Funds during the Calendar Years 1922, 1923, 1924 and 1925	92
LVIII.	Statement showing amounts Appropriated, Refunded and Lapsed under House Bill 766	93
LIX.	Statement showing amounts Appropriated, Refunded and Lapsed under House Bill 867	94
LX.	Statement showing amounts Appropriated, Refunded and Lapsed under House Bill 822	95
LXI.	Statement showing amounts Appropriated, Refunded and Balances at December 31, 1925, under Senate Bill 515	96

DIVISION OF HIGHWAYS.

Frank T. Sheets, *Chief Highway Engineer.*

I. GENERAL.

This report contains a summary of the activities of the Division of Highways for the calendar year ending December 31, 1925, and is submitted as a part of the Administrative Report required under Section 25 of the Civil Administrative Code.

1. THE DIVISION.—The Division of Highways is a statutory body having immediate control and supervision of the location, construction and maintenance of State highways. It is charged with the Administration of the provisions of the $60,000,000 Bond Issue Act of 1918 and the $100,000,000 Bond Issue Act of 1924.

2. ORGANIZATION.—The Division of Highways is a part of the Department of Public Works and Buildings and is administered by a Superintendent of Highways, a Chief Highway Engineer, and an Assistant Chief Highway Engineer. These officers are assisted by a staff consisting of an Engineer of Design, an Engineer of Bridges, an Engineer of Roads, an Engineer of Construction, an Engineer of Maintenance, an Engineer of Materials, a Superintendent of Machinery, and a Chief Clerk.

The administrative functions of the Division are handled through six Bureaus: The Bureau of Design, which is divided into a Road Section and a Bridge Section; and the Bureaus of Construction, Maintenance, Materials, Machinery and Audits. These Bureaus are in charge of the staff officers named above.

The State is divided into nine highway districts, with a District Engineer in charge of each, who works with each Bureau insofar as his duties concern that Bureau.

3. HIGHWAY DEVELOPMENT.—Figures 1 and 2 show the highway development in Illinois from January 1, 1921, to January 1, 1926. Figure 3 shows the mileage of pavement laid each year from 1914 to 1925, inclusive. Note the contrast in the accomplishments during the years 1921 and 1925 inclusive, as compared to the previous years. The total mileage built during the twelve years is 5,577 miles, of which 78 per cent has been completed during the past five years, or the mileage built during the administration of Governor Len Small is three and one-half times the mileage completed during the preceding seven years.

4. WORK ACCOMPLISHED DURING 1925.—There was a decrease in the production of completed, durable, hard-surfaced roads during the year 1925 as compared with the accomplishments of 1924 when the world's record of 1,230 miles was made. This decrease in

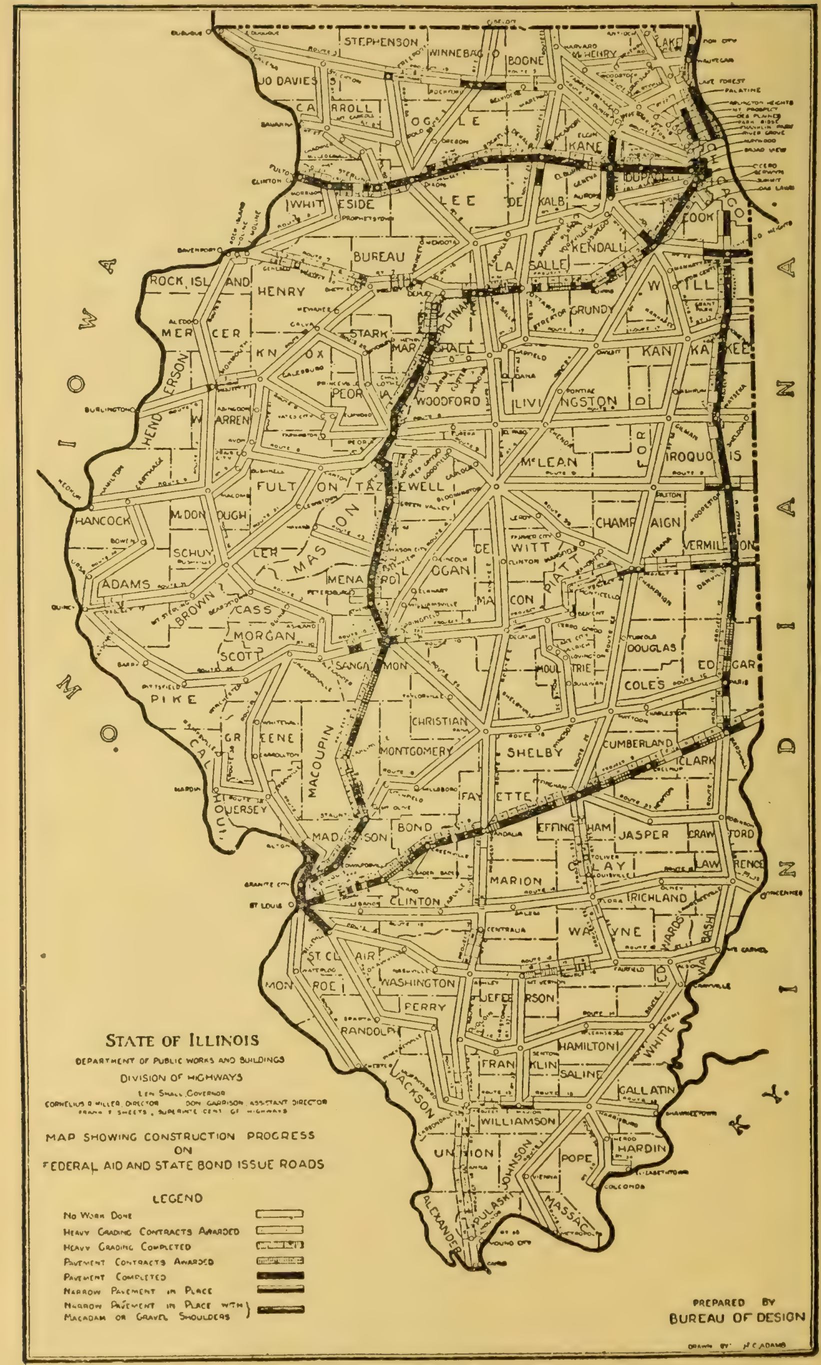
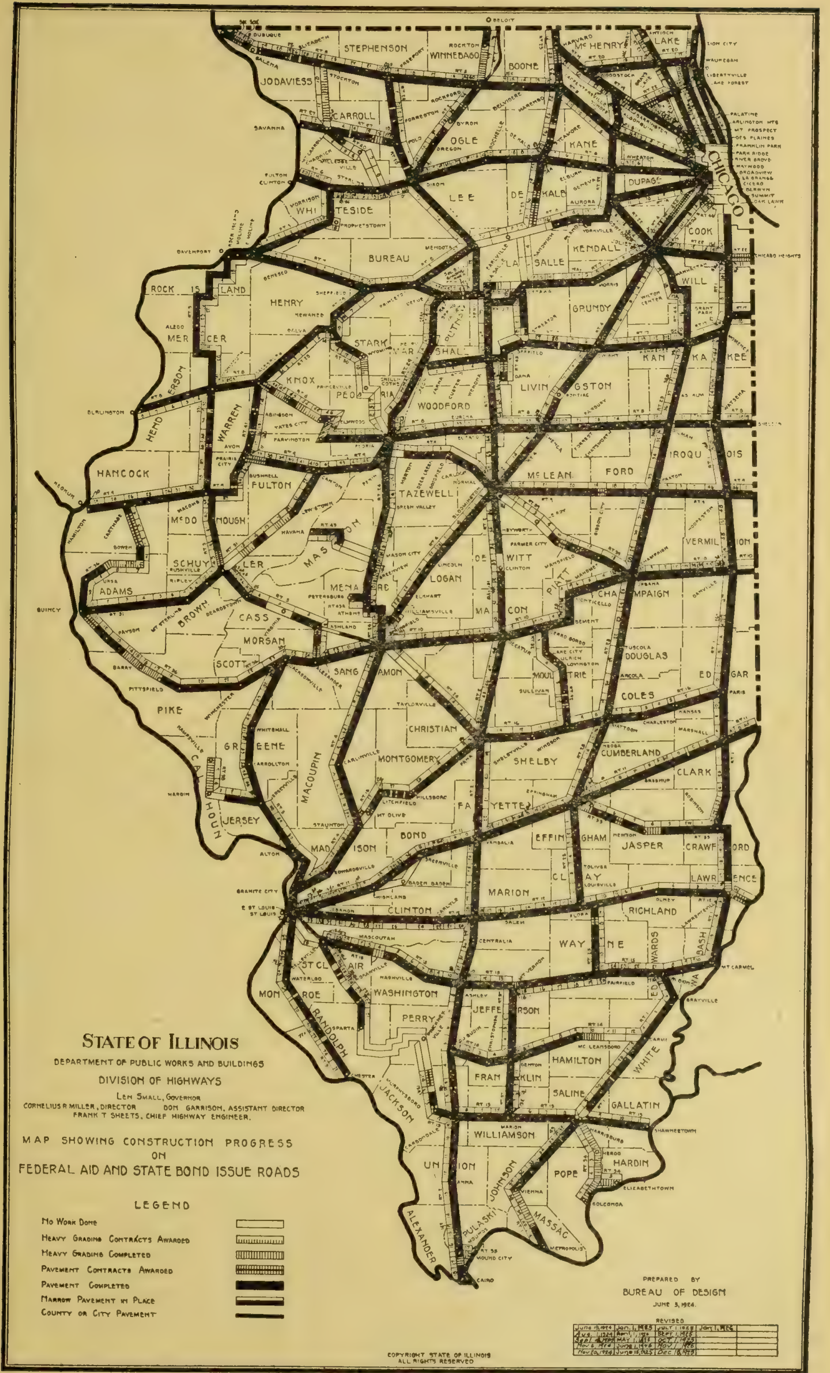


Figure 1.—As Illinois looked January 1, 1921.


STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
LEN SMALL, GOVERNOR
CORNELIUS R MILLER, DIRECTOR
DON GARRISON, ASSISTANT DIRECTOR
FRANK T SHEETS, CHIEF HIGHWAY ENGINEER.
MAP SHOWING CONSTRUCTION PROGRESS ON FEDERAL AID AND STATE BOND ISSUE ROADS
LEGEND
No Work Done
Heavy Grading Contracts Awarded
Heavy Grading Completed
Pavement Contracts Awarded
Pavement Completed
Narrow Pavement in Place
County or City Pavement
PREPARED BY BUREAU OF DESIGN JUNE 3, 1924.
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CHICAGO

Figure 2.—As Illinois looked December 31, 1925.

pavement production was caused by difficulties encountered in placing under contract the uncompleted portions of the $60,000,000 bond issue system. The $100,000,000 bond issue law provides that, unless engineering problems make it clearly impractical, all contracts for the complete construction of the roads to be constructed along and upon Routes 1 to 46, inclusive, shall first be awarded before any construction contracts are awarded for the roads along and upon Routes 47 to 185, inclusive. Many location problems have arisen in connection with uncompleted portions of Routes 1 to 46, as well as court action in several cases involving the right of the Department to locate new roads. A Supreme Court decision will be necessary to settle this question, and a case is now pending before that body. It is hoped that all of these matters will be adjusted so that the new work can proceed during 1926.

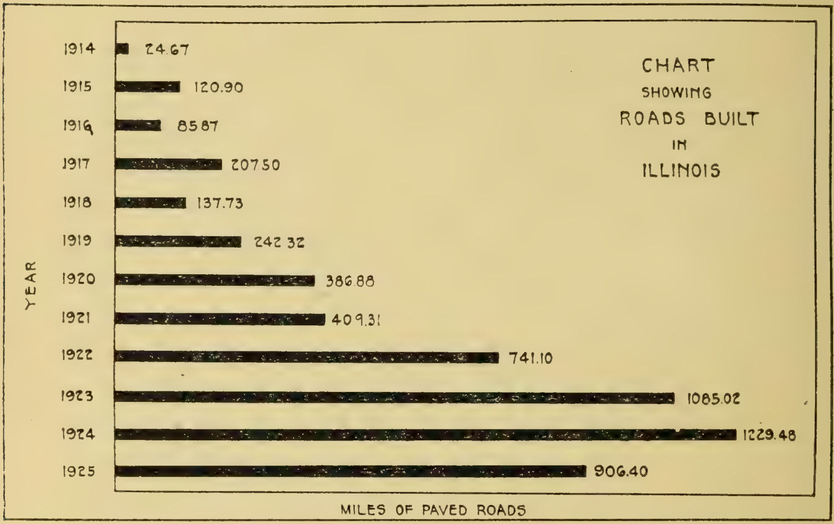


Figure 3.

A total of 906.40 miles of durable, hard-surfaced roads were completed in 1925, 786.9 miles of which were on the State bond issue system. Of the total mileage, 882.8 miles were Portland cement concrete, 9.1 miles brick on a concrete base, and 14.5 miles macadam or gravel.

During the season, 130 paving mixers were operating, and 7,000 men and 1,500 teams were employed directly in the construction of road and bridge work. The maximum rate of construction per week was about 47 miles and the average about 37 miles.

5. DETAILED REPORT BY BUREAUS.—Economy consistent with the best interests of the State has been the policy of each of the Bureaus. A detailed report of their activities for 1925 will be found in the following pages. Since this is the annual report of the Division, and since the work naturally arranges itself by calendar years, all statistical information given is based on the calendar year 1925.

II. BUREAU OF DESIGN.

A. Road Section.

1. SURVEYS AND PLANS.—With a few exceptions, all surveys for the various routes on the original $60,000,000 Bond Issue Road System had been completed by the end of 1924. Such survey work as was accomplished during 1925 consisted of a relatively small mileage on which there had been delay in determining exact location, and small portions of some routes on which re-surveys were made on account of changes in location.

The preparation of plans follows very closely the completion of surveys and, as a result, all plan work on the $60,000,000 Bond Issue System was practically completed by the end of 1925.

2. CONTRACTS AWARDED.—Table I and Table II show the contracts for road work which have been awarded directly by the State from 1914 to 1925, inclusive, on the Federal aid, State bond issue, and State aid systems.

TABLE I—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1918	--------	--------	--------	--------	--------	8.36	$ 201,619.40	$24,131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401.77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47.57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1.488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5.818.01	83	901,884.69	472.05	12,634,976.84	26.766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23.123,159.60	26,617.20
1924	163.93	2.013,223.70	12.280.99	84	1,070,387.21	503.54	13,597,135.32	27,003.09
1925	143.78	1,330,186.60	9,251.54	135	2,607,739.92	899.20	23,818,244.21	26,488.26
Total	1,167.68	$11,529,433.34	$9,873.79	798	$10,560,788.86	3,896.87	$108,587,064.21	$27,865.20

Note.—Grading and bridge work shown does not necessarily coincide with the pavement shown. No Federal Aid or State Bond Issue Contracts were awarded previous to 1918.

TABLE II—STRAIGHT STATE AID CONTRACTS AWARDED.

Year.	Earth roads.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1914	--------	--------	--------	7	$ 815.00	91.61	$ 963,216.54	$10,514.32
1915	1.75	$ 21,643.58	$12,367.76	308	178,708.65	74.65	738,623.55	9,824.49
1916	186.11	401,613.65	2,157.94	90	62,953.19	97.34	1,212,655.01	12,457.93
1917	181.13	412,056.55	2,274.92	90	77,281.66	90.57	1,333,000.12	14,717.90
1918	--------	--------	--------	5	44,288.00	2.75	73,708.35	26,803.08
1919	71.10	262,394.20	3,690.50	36	51,588.00	52.08	1,136,920.79	21,830.28
1920	2.76	29,571.32	10,714.25	5	11,890.00	3.48	99,793.61	28,676.32
1921	2.22	9,981.22	4,496.05	19	22,130.33	2.76	46,104.45	16,704.51
1922	.27	3,334.65	12,350.56	5	2,705.00	2.98	49,264.70	16,531.78
Total	445.34	$1,140,595.17	$2.561.18	565	$452,359.83	418.22	$5,653,287.12	$13.517.50

Note.—Table shows total cost, one-half of this cost was paid by County and one-half by State. Pavement includes all types and widths.

There have been no appropriations for State Aid Work available since 1922.

A number of counties have made improvements in their State aid road systems under the provisions of Section 15d of the Road and Bridge Laws. This section provides that any county may improve its State aid roads more rapidly than its allotments of State aid funds will permit, advancing the entire cost of construction from county funds. In such event, the county may accept any future allotment of State aid money as a refund for the State's portion of the cost of the improvement, using this refund in the payment of bonds or other obligations it has incurred in the construction of such roads, or to defray one-half the cost of improving further State aid roads.

Plans, specifications, estimates, and contracts for all 15d work must be approved by the Department of Public Works and Buildings, which also supervises the construction and when the improvement is completed and accepted, bears the same share of the maintenance cost that it would had the work been done as a straight State aid proposition.

Table III shows the amount of 15d work placed under contract in the State as a whole from 1916 to 1925, inclusive, while Table IV shows the amount of 15d work placed under contract by the various counties during 1925.

TABLE III—15D CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1916						174.58	$2,204,680.94	$12,628.49
1917	25.93	$ 60,658.01	$2,339.30	16	$ 5,065.00	37.34	745,962.28	19,977.56
1918	11.00	45,609.17	4,146.29	21	44,179.64	10.84	270,480.54	24,952.08
1919	42.58	167,425.56	3,932.02	25	40,680.00	153.94	4,391,177.96	28,525.26
1920	13.07	104,533.72	7,997.98	10	185,494.87	44.06	1,626,373.67	36,912.70
1921	17.57	100,154.52	5,700.31	4	61,746.82	58.09	1,311,946.53	22,584.72
1922	15.23	102,085.56	6,702.92	87	359,743.96	258.34	5,637,805.33	21,823.20
1923	15.32	168,804.06	11,018.54	22	620,366.61	187.41	3,433,764.03	18,322.20
1924	21.38	221,007.97	10,337.14	65	329,099.57	174.15	3.528,734.26	20,262.61
1925	52.36	533,349.06	10,186.19	38	358,394.54	122.48	2.966,340.07	24,218.98
Total	214.44	$1,503,627.63	$7,011.88	288	$2,004,771.01	1,221.23	$26,117,265.61	$21,386.03

3. UNIT PRICES.—In Figure 4 are graphs showing the range in unit costs for the principal items in highway construction during 1925. These graphs are based on actual contract prices. The dates at the bottom of the chart show the date bids were submitted, while the various points on the graphs are plotted from weighted average unit prices.

Figure 5 shows the weighted average unit prices by years from 1919 to 1925, inclusive. It is interesting to note the great reductions which were affected in all unit prices in 1921, with still further de-

TABLE IV—CONTRACTS AWARDED FOR COUNTY 15D WORK—1925.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Bureau			1	$ 13,245.76			$ 13,245.76
Champaign			8	49,113.47	29.881	*$ 512,747.03	561,860.50
Coles					2.150	37,169.71	37,169.71
Cook	31.706	$357,905.55	8	199,461.70	31.706	1,068,679.67	1,626,046.92
DeKalb	0.246	27,032.99					27,032.99
DuPage			4	50,317.67	21.811	591,528.87	641,846.54
Edwards					0.492	2,458.62	2,458.62
Fulton			5	3,830.30	1.079	30,267.73	34,098.03
Henderson			1	4,987.48			4,987.48
Iroquois					3.500	36,677.64	36,677.64
Kane	6.067	27,814.80	1	4,803.00	8.640	200,029.56	232,647.36
Lake	6.731	66,136.24			4.035	111,006.78	177,143.02
Lee					2.307	15,886.54	15,886.54
Livingston			8	15,503.30	2.250	62,950.06	78,453.36
Mason					3.175	50,349.68	50,349.68
Peoria					1.882	47,154.43	47,154.43
Piatt					1.198	17,498.87	17,498.87
Putnam					1.577	16,975.69	16,975.69
Rock Island					0.312	7,474.61	7,474.61
St. Clair	0.438	9,251.60	2	17,131.86	2.802	91,835.53	118,218.99
Schuyler					0.758	22,631.40	22,631.40
Will					2.010	19,528.85	19,528.85
Williamson	0.916	7,259.58			0.916	23,488.80	30,748.38
Winnebago	6.260	37,948.30					37,948.30
Total	52.364	$533,349.06	38	$358,394.54	122.481	$2,966,340.07	$3,858,083.67

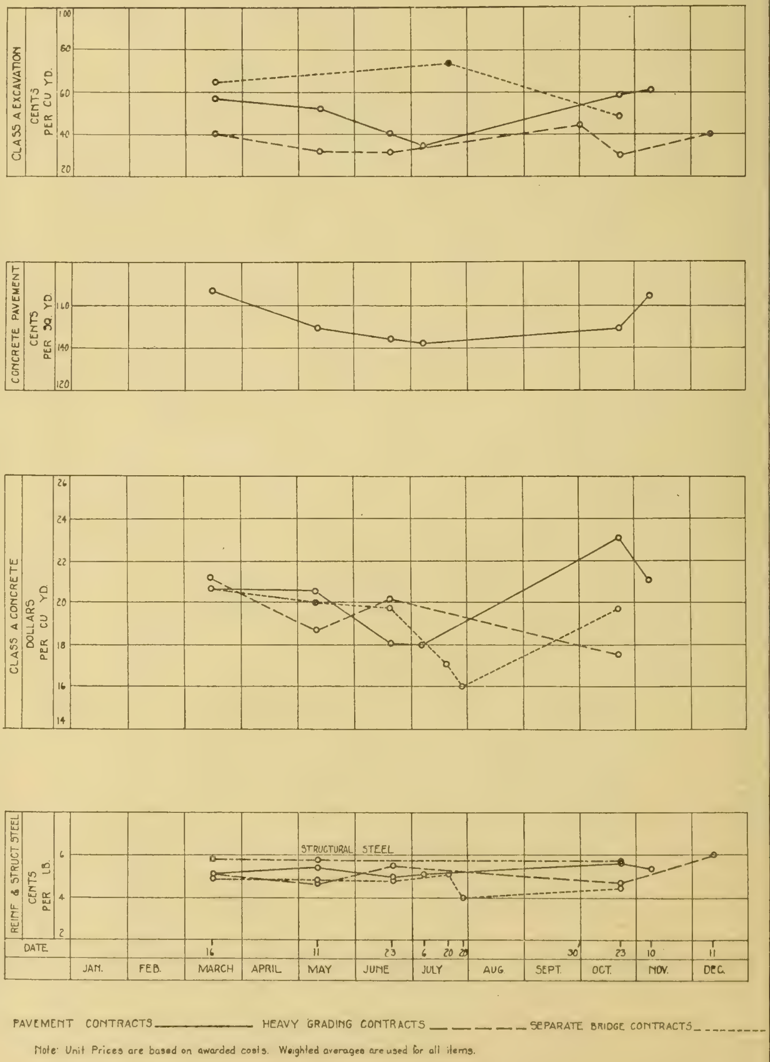
* Cost of pavement includes $10,500.00 for separate guard fence contract.

creases in 1922. The fact that prices have been very nearly constant since 1922 indicates that highway costs are becoming stabilized.

In both Figures 4 and 5, unit prices for pavement and for concrete do not include cement, which is furnished the contractor by the State.

4. RESPONSIBILITY OF BIDDERS.—The Department has always followed the policy of awarding every contract for construction on the State highway system to the lowest responsible bidder. Before any bid is accepted, the bidder must give evidence that he has sufficient funds to finance the proposed contract, and that he has the proper equipment, organization, and ability to prosecute the work successfully. Failure to complete a contract within the specified time, or dilatory methods in carrying on the work, result in inconvenience and loss to the traveling public, and the Department endeavors to prevent this wherever possible by satisfying itself that the contractors are competent.

The large construction program of the past few years has attracted a large number of contractors from other states, and has influenced many new-comers to enter the highway contracting field. With numerous contractors, whose qualifications are not known, bidding on work, investigation of their responsibility has become increasingly complex. In order to simplify such investigations and secure uniform information from all bidders, the Department requires each to file,



GRAPHS SHOWING UNIT PRICE RANGE
ON PRINCIPAL ITEMS
IN HIGHWAY CONSTRUCTION DURING 1925

Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 4.

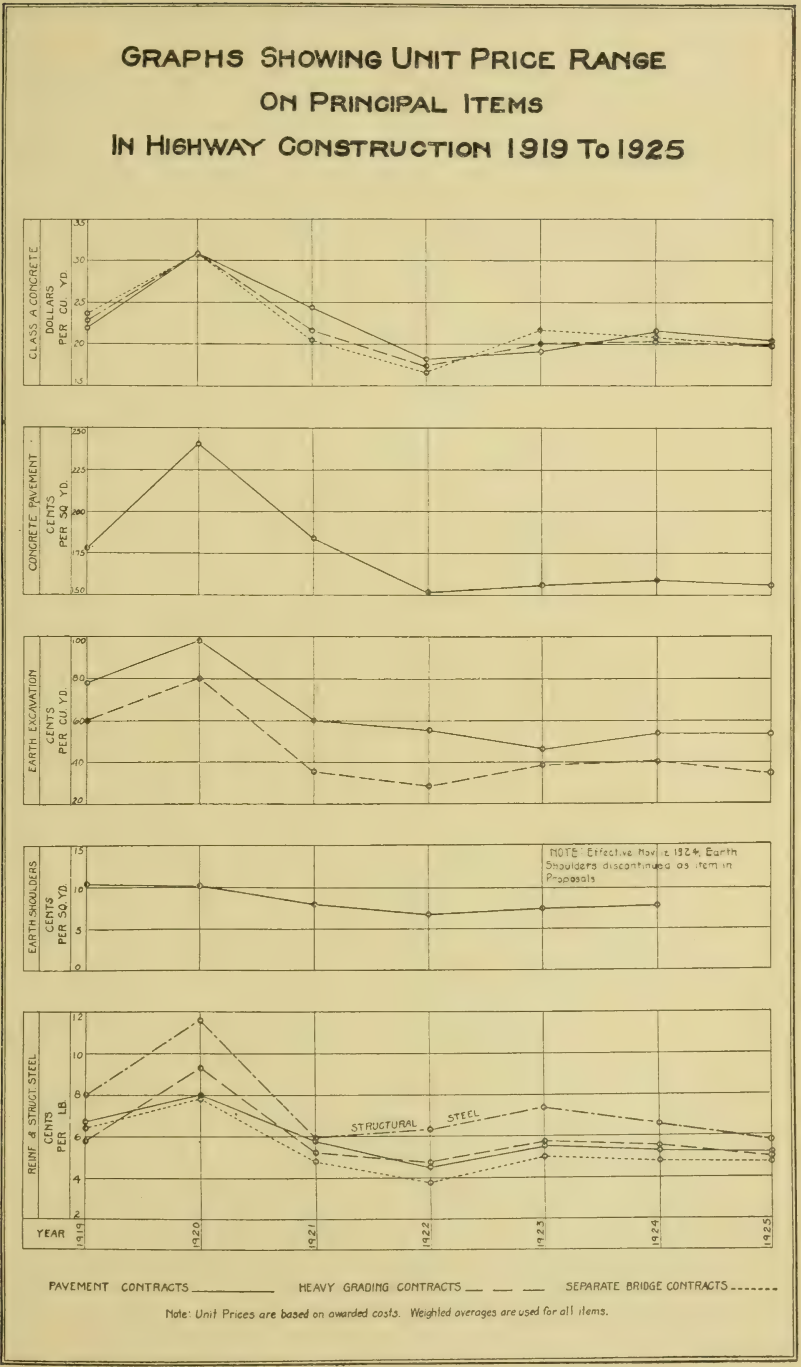

GRAPHS SHOWING UNIT PRICE RANGE
ON PRINCIPAL ITEMS
IN HIGHWAY CONSTRUCTION 1919 TO 1925
CLASS A CONCRETE
DOLLARS PER CU. YD.
35
30
25
20
15
CONCRETE PAVEMENT
CENTS PER SQ. YD.
250
225
200
175
150
EARTH EXCAVATION
CENTS PER CU. YD.
100
80
60
40
20
EARTH SHOULDERS
CENTS PER SQ. YD.
15
10
5
0
NOTE: Effective Nov 1, 1924, Earth Shoulders discontinued as item in Proposals
REINF. & STRUCT. STEEL
CENTS PER LB.
12
10
8
6
4
2
STRUCTURAL STEEL
YEAR
1919
1920
1921
1922
1923
1924
1925
PAVEMENT CONTRACTS
HEAVY GRADING CONTRACTS
SEPARATE BRIDGE CONTRACTS
Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 5.

with his proposal, a sworn financial statement and an equipment and experience questionnaire.

The financial statement, prepared on a form designed by the Department, lists the assets and liabilities of the bidders. Doubtful items in the statement are verified through financial references.

In the equipment and experience questionnaire, which is also submitted on a standard form prepared by the Department, the bidder schedules the equipment he proposes to use on the work under consideration, lists former construction work, gives references, describes his organization, and outlines his plan for carrying out the contract. In the case of new bidders, references are consulted.

During the latter part of 1925, the practice of requiring low bidders to prepare a satisfactory working plan and progress chart before awarding contract was adopted. The bidder prepares a detailed lay-out of the section, showing the plan he intends to follow during construction. He also prepares a chart showing the progress he expects to make. During construction, actual progress may be compared with that estimated, and if unsatisfactory, such increase in production may be required as is necessary.

The Bureau of Construction keeps a record of the performance of all contractors on State work, while the Bureau of Audits keeps a record of the manner in which they meet their financial obligations. By consulting these records, it is possible to anticipate what might be expected should any one of these contractors submit bids for further work.

5. CHANGES IN DESIGN.—During 1925 the Department endeavored to maintain road design to the same high standard employed in the past. Such changes were made in standard policies as experience indicated desirable. Some of the more important revisions are listed below:

a. Pavement and Construction Joint Adjacent to Bridges.—A new design was adopted for pavement and construction joint adjacent to bridges. In this design the approach slab to the bridge is designed to carry the maximum loads permitted under the Motor Vehicle Law. The slab is of 9-inch uniform thickness with reinforcing, and extends at least two feet back of the beginning of the backfill. A one-half inch bituminous filled joint is placed between the approach slab and bridge floor, and a four-inch open joint is provided between the approach slab and the standard pavement. It is believed that this design will reduce maintenance expense and, at the same time, improve the riding qualities of the bridge approaches.

b. Minimum Standard for Railroad Grade Crossings.—While it is realized that each railroad grade crossing presents conditions which must be worked out to satisfy the case at hand, it was considered desirable to adopt certain standards to govern, in a general way, the grade lines to be employed. The standard adopted, requires that the approach grade to the track be not more than three per cent; that the theoretical tangent grade extend at least 50 feet on each side of the track, and that not less than 100-foot vertical curves be used at the intersection of the tangent and approach grades.

c. *Minimum Pavement and Roadway Widths in Metropolitan Areas.*—During the latter part of 1925, a definite policy regarding increased widths of pavement and roadway, in the territory tributary to Chicago, was adopted. In that area bounded by State Bond Issue Route 22, all pavements are to be at least 20 feet wide, with earth shoulders not less than eight feet wide on each side. All cross road culverts or bridges are to have a clear roadway width of 44 feet. This policy is to apply to all future county 15d, as well as State bond issue work.

d. *Pavement Width on Bridges.*—In the past it has been the practice to build pavement over bridges the same width as that adjacent thereto, filling in the space between the edge of the pavement and the hub-guard with crushed rock or gravel. In 1925 a policy was adopted whereby the pavement is to be the full width of the bridge roadway, on all bridges having roadway widths up to 22 feet.

e. *Separate Contracts for Guard Fence.*—Prior to 1925 all guard fence was included in pavement contracts. It is believed that better prices and workmanship can be obtained by awarding separate contracts for guard fence construction, and with this idea in view, this item was eliminated from all paving contracts awarded during 1925.

6. PAVEMENT CROSS SECTIONS.—The thickened edge design of pavement cross sections was continued as standard on all road work placed under contract in 1925. No changes of any consequence were made in this design during the year, although an additional heavy traffic section was adopted for special use.

Figures 6 and 7 show the pavement cross sections used during 1925. The 18-foot standard Portland cement concrete section with 6-inch central thickness and 9-inch edges was used on the majority of the work. The 18-foot heavy traffic section with 7-inch central thickness and 9-inch edges was employed near the large centers of population, where extremely heavy truck traffic is anticipated. The 20-foot heavy traffic section was designed in 1925 for use in the vicinity of Chicago. The bituminous concrete and bituminous filled brick sections are provided as alternates to the Portland cement concrete type. The 10-foot Portland cement concrete and the macadam and gravel sections were used on some of the county 15d work.

7. REVISIONS IN SPECIFICATIONS.—A complete revision was made in the standard specifications covering road and bridge construction to apply to work awarded in 1925. The following are some of the important changes made:

a. Allowable percentage of additions or deductions increased from 15 to 25 per cent of contract price.

b. Engineer has authority to require replacement of unsatisfactory equipment.

c. Contractor is held responsible for preservation and restoration of private and public property.

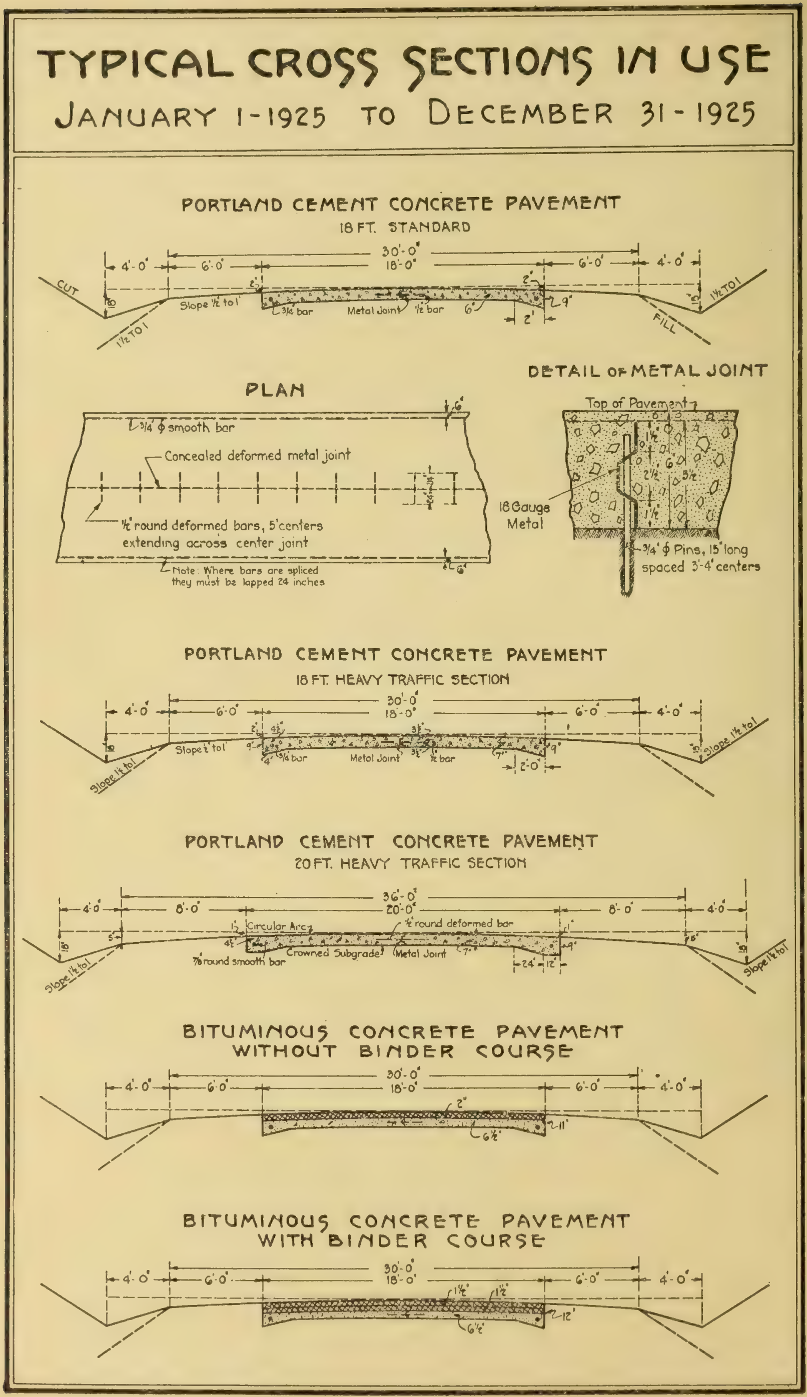

TYPICAL CROSS SECTIONS IN USE
JANUARY 1-1925 TO DECEMBER 31-1925
PORTLAND CEMENT CONCRETE PAVEMENT
18 FT. STANDARD
30'-0"
18'-0"
4'-0"
6'-0"
CUT
1½ TO 1
Slope ½ to 1
¾ bar
Metal Joint
½ bar
6"
2'
9"
FILL
PLAN
¾ ɸ smooth bar
Concealed deformed metal joint
½" round deformed bars, 5' centers extending across center joint
Note: Where bars are spliced they must be lapped 24 inches
DETAIL OF METAL JOINT
Top of Pavement
18 Gauge Metal
¾" ɸ Pins, 15" long spaced 3'-4" centers
PORTLAND CEMENT CONCRETE PAVEMENT
18 FT. HEAVY TRAFFIC SECTION
30'-0"
18'-0"
4'-0"
6'-0"
Slope ½ to 1
Slope 1½ to 1
¾ bar
Metal Joint
½ bar
2'-0"
PORTLAND CEMENT CONCRETE PAVEMENT
20 FT. HEAVY TRAFFIC SECTION
36'-0"
20'-0"
4'-0"
8'-0"
Circular Arc
½" round deformed bar
⅞ round smooth bar
Crowned Subgrade
Metal Joint
24"
12"
Slope 1½ to 1
BITUMINOUS CONCRETE PAVEMENT WITHOUT BINDER COURSE
30'-0"
18'-0"
4'-0"
6'-0"
2"
11"
6½"
BITUMINOUS CONCRETE PAVEMENT WITH BINDER COURSE
30'-0"
18'-0"
4'-0"
6'-0"
1½"
1½"
12"
6½"

Figure 6.

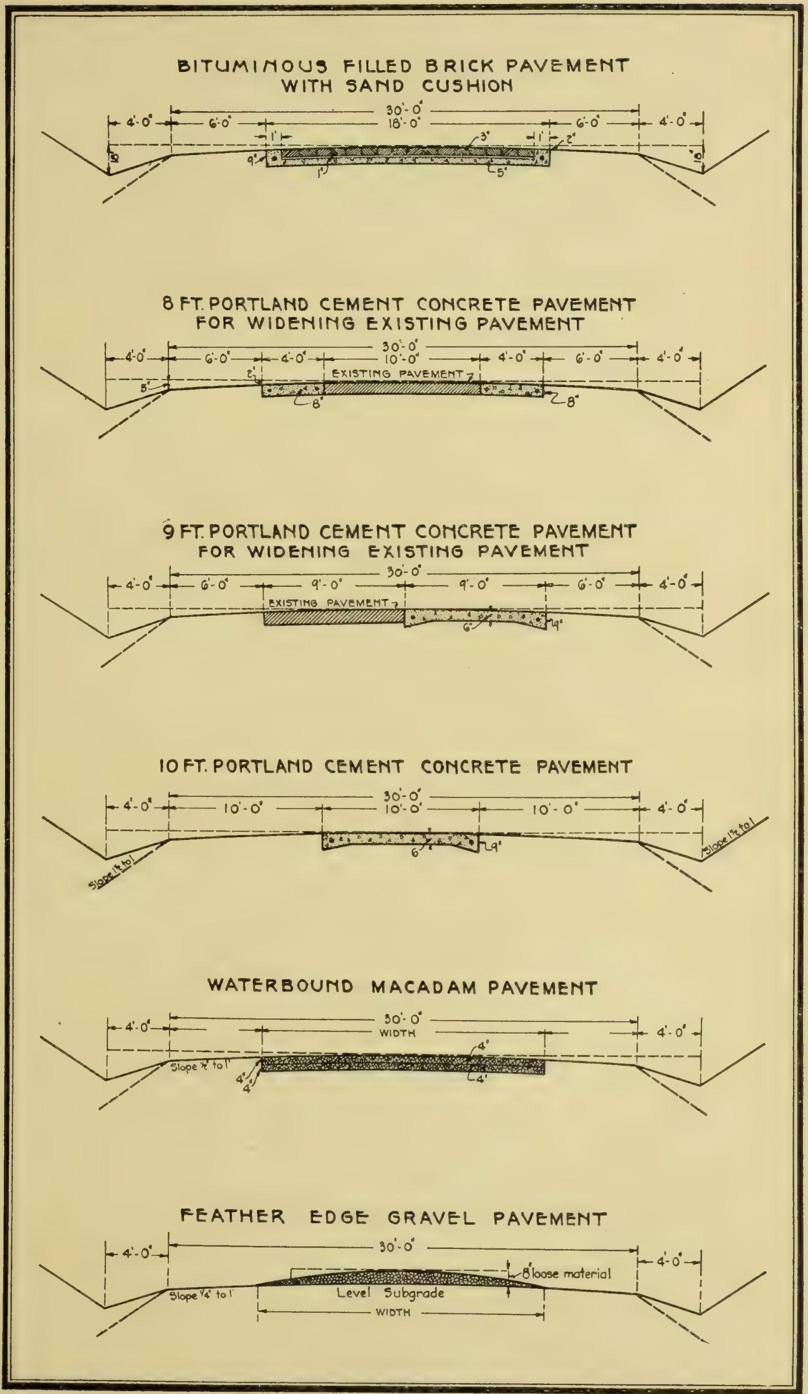

BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION
30'-0"
4'-0"
6'-0"
18'-0"
6'-0"
4'-0"
1'
1'
3"
2"
9"
1"
5"
10"
10"
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
4'-0"
10'-0"
4'-0"
6'-0"
4'-0"
EXISTING PAVEMENT
2"
5"
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
9'-0"
9'-0"
6'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
4'-0"
10'-0"
10'-0"
10'-0"
4'-0"
6"
9"
Slope 1½ to 1
Slope 1½ to 1
WATERBOUND MACADAM PAVEMENT
30'-0"
4'-0"
WIDTH
4'-0"
Slope ¼" to 1'
4"
4"
4"
4"
FEATHER EDGE GRAVEL PAVEMENT
30'-0"
4'-0"
4'-0"
8" loose material
Slope ¼" to 1'
Level Subgrade
WIDTH

Figure 7.

d. "Tentative standard methods of sampling and testing highway materials as adopted by American Association of State Highway Officials—1922" adopted.

e. No surfacing of higher type than gravel permitted on any fill until after thirty days settlement, or when fill is over 4 feet in depth, until after ninety days settlement.

f. Gross weight of trucks on sub-grade for concrete pavement or base course limited to 550 pounds per inch width of tire.

g. Cost of furnishing earth shoulders included in unit prices for excavation.

h. An intermediate classification of excavation provided.

i. Different brands or grades of cement required to be stored separately; mixing different cements or using same alternately in one class of construction, prohibited.

j. Method of testing strength of steel forms is provided.

k. Slump test is supplemented by visual test for consistency of concrete.

l. Use of mixer requiring less than four sacks of cement on pavement, or one sack on bridges, prohibited.

m. Certain hand finishing operations required after compacting pavement by machine.

n. High spots in pavement to be removed by carborundum brick. For each high spot remaining, cost of one square yard of pavement deducted. Bush-hammering not permitted.

8. FEDERAL AID.—Table V shows all Federal aid allotments which have been made to the State of Illinois.

TABLE V—FEDERAL AID ALLOTMENTS.

Fiscal year ending June 30.	Fund.	Amount allotted to Illinois.	Sub-total.
1917	$ 75,000,000.00	$ 220,926.23	
1918		441,852.46	
1919		658,323.48	
1920		874,220.26	
1921		1,091,266.98	
			$3,286.589.41
1919	200,000,000.00	$2,185,550.65	
1920		3,278,325.97	
1921		3,273,800.93	
			8,737,677.55
1922	75,000,000.00	$3,246,281.07	
			3.246,281.07
1923	50,000,000.00	$2,164,187.38	
1923	Reapportionment	$ 28,611.00	
1924	65,000,000.00	2,797,888.59	
1925	75,000,000.00	3,203,867.99	
1926	75,000,000.00	3,191,479.00	
			11,386,033.96
Total Federal aid allotments to Illinois			$26,656,581.99

The status of Federal aid funds on January 1 ,1926, is shown in Table VI. As this table indicates, there are four distinct stages in Federal aid procedure, namely: Project Statement, Project Agree-

TABLE VI—STATUS OF FEDERAL AID FUNDS—JANUARY 1, 1926.

Project No.	S. B. I. route No.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
1-31		882.600					$210,752.94	$26,709.22	$29,814,111.45	$13,717,184.33	$13,717,184.33
32	15	12.730					10,614.66	5,307.33	309,403.19	153,138.08	153,138.08
33	9	8.163					94,306.92	41,371.53	212,156.44	101,405.00	101,405.00
34	12	8.675							297,777.81	145,301.79	145,301.79
35	12	7.590							190,697.38	95,065.91	95,065.91
36	2	10.245							257,466.04	127,894.86	127,894.86
37	12	0.580							87,353.17	42,225.61	42,225.61
38	3	12.232							415,985.84	199,203.12	199,203.12
39	27	7.732							278,834.60	131,138.92	131,139.92
40	9	12.105							336,996.34	164,461.23	164,461.23
41	5	5.033							133,696.57	66,848.28	66,848.28
42	1	6.316							230,194.23	111,691.52	111,691.52
43			Project withdrawn								
44	24	6.628							185,294.24	91,481.84	91,481.84
45	36	6.044							188,943.39	91,275.82	91,275.82
46	3	13.896	$117,358.68	$58,679.34					239,456.10	119,728.05	119,728.05
47	3	10.130							278,831.91	131,114.97	131,114.97
48	8	13.531							416,621.41	200,447.45	200,447.45
49	17	28.583					43,908.32	21,954.16	713,581.39	352,020.26	352,020.26
50	25	14.009							338,567.92	169,289.95	169,283.95
51	9	4.649							116,072.29	56,793.71	56,793.71
52	1	4.069							103,572.93	50,752.40	50,752.40
53	1	4.926							163,768.74	80,047.50	80,047.50
54	2	5.931							135,620.97	67,661.62	67,661.62
55	7 & 29	8.460					27,968.80	10,946.00	314,195.11	130,346.85	130,346.85
56	9	20.213					15,924.22	7,962.11	518,348.55	259,173.06	259,173.06
57	13	6.056							177,368.98	88,684.49	88,684.49
58	16	5.116							148,245.78	74,122.89	74,122.89
59	18 & 22	19.193					16,988.95	8,494.47	547,077.80	263,941.86	263,941.86
60	20	4.267							124,066.02	61,638.46	61,638.46
61	25	23.472							594,578.45	295,407.55	295,407.55
62			Project withdrawn								
63	28	9.336							235,804.26	117,602.74	117,602.74
64	30	3.700							105,983.47	52,991.73	52,991.73
65	31	5.449							158,044.76	76,048.09	76,048.09
66	32	7.952							201,436.96	100,718.48	100,718.48
67	42	3.525							110,623.14	52,279.55	52,279.55
68	44	3.057							124,691.42	59,924.13	59,924.13

TABLE VI—Concluded.

Project No.	S. B. I. route No.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
69	17	0.132					$ 14,085.70	$ 7,042.85	$173,890.13	$ 80,478.05	$ 80,478.05
70	12	6.603							212,872.92	103,921.95	103,921.95
71	14	6.492					20,362.58	11,167.48	179,609.42	86,212.52	86,212.52
72	43	10.114							286,860.90	142,327.29	142.327.29
73	25	7.320							173,745.89	85,082.06	85,082.06
74	26	5.622							163,136.56	81,568.28	81,568.28
75	19 & 23	18.089							513,755.37	254,634.32	254,634.32
76	3	13.020							364,117.22	181,381.70	181,381.70
77	2	18.086					14,018.36	7,009.18	475,675.82	237,837.90	237,837.90
78	8	7.296					5,480.92	2,740.46	185,522.86	92,761.43	92,761.43
79	31	5.438							148,641.85	74,320.92	74,320.92
80	12	6.995							175,369.99	87,684.99	87,684.99
81	2	25.159					53,643.71	26,821.86	631,598.67	315,799.32	315,799.32
82	18	22.140					60,209.75	30,104.88	542,038.31	271,019.15	271,019.15
83	19	7.477							205,492.01	101,178.03	101,178.03
84	8	21.430					85,416.19	42,708.09	504,335.92	252,150.58	252,150.58
85			Project withdrawn								
86			No project								
87	3	4.348					63,609.67	29,564.08	78,829.94	35,655.92	35,655.92
88	18	13.995	$403,520.00	$201,760.00							
89	3	12.048	141,185.39	70,592.69	$12,384.61	$6,192.30	15,543.99	7,772.00	234,263.40	117,131.69	117,131.69
90	3	7.649					25,348.30	12,674.15	193,004.98	96,502.49	96,502.49
91	31	3.303					12,324.78	6,163.02	98,595.42	43,381.98	43,381.98
92	3	13.274					248,210.67	124,105.33	125,600.23	62,800.11	62,800.11
93	3	19.504					242,270.89	121,033.01	310,911.10	155,455.54	155,455.54
94	22	5.076					154,946.34	77,473.17			
95	23	20.735			12,784.53	6,392.26	62,702.80	31,351.40	464,401.20	232,200.59	232,200.59
96	13	21.049	12,485.65	6,690.00			134,050.58	64,111.36	449,098.93	220,571.13	220,571.13
97	9	30.212					459,545.02	229,772.52	396,126.05	198,063.01	198,063.01
98	16	12.859					159,590.07	79,795.03	183,311.00	91,655.50	91,655.50
99	9	19.082					548,127.98	267,038.31			
100			No project								
101		2.015					71,203.85	35,282.00			
102	24	13.700	479,600.00	239,800.00							
	Total	1,586.455	$1,154,149.72	$577,522.03	$25,169.14	$12,584.56	$2,871,156.96	$1,336,475.00	$46,276,274.84	$21,800,822.55	$21.800,822.55

ment Estimate, Project Agreement and Completed Work. The first three columns indicate the successive steps which must be taken before Federal aid may be received; while the sum of the amounts requested, as shown in these columns, is the approximate total Federal aid to be received on outstanding projects. The last column shows the total amount of Federal aid funds which have been received for completed work.

9. STATE AID.—The Road and Bridge Laws provide that all parts of the State aid road system not taken over by the Department of Public Works and Buildings shall be under the jurisdiction and control of the various county boards. A county highway tax is provided to furnish funds for the maintenance of State aid roads.

The various counties are constantly making revisions or additions to their State aid systems, in order that county maintenance may be applied to their more important roads. Before a change may be made in the State aid system of any county, it must be approved by the Department of Public Works and Buildings.

The status of State aid mileage in the various counties, as of January 1, 1926, is shown on Table VII.

TABLE VII—STATUS OF STATE AID MILEAGE.

County.	Class.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
Adams	2	1,538.00	384.50	353.25	31.25
Alexander	1	427.00	85.40	60.55	24.85
Bond	1	655.00	131.00	111.74	19.26
Boone	1	492.00	98.40	91.40	7.00
Brown	1	513.00	102.60	79.80	22.80
Bureau	2	1,481.00	370.25	299.10	71.15
Calhoun	1	317.80	63.56	58.80	4.76
Carroll	1	748.00	149.60	118.35	31.25
Cass	1	570.00	114.00	97.92	16.08
Champaign	2	1,910.00	477.50	381.13	96.37
Christian	2	1,269.00	317.25	260.30	56.95
Clark	1	994.00	198.80	199.45	----------
Clay	1	842.00	168.40	138.30	30.10
Clinton	1	704.00	140.80	100.10	40.70
Coles	2	968.00	242.00	187.65	54.35
Cook	3	1,503.50	451.05	453.91	----------
Crawford	1	821.00	164.20	127.80	36.40
Cumberland	1	687.00	137.40	93.25	44.15
DeKalb	2	1,089.00	272.25	242.23	30.02
DeWitt	1	732.00	146.40	116.25	30.15
Douglas	1	790.00	158.00	101.65	56.35
DuPage	2	776.00	194.00	155.25	38.75
Edgar	2	1,105.00	276.25	266.53	9.72
Edwards	1	414.00	82.80	52.70	30.10
Effingham	1	956.00	191.20	142.05	49.15
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	130.60	39.00
Franklin	1	648.00	129.60	121.45	8.15
Fulton	2	1,488.00	372.00	347.75	24.25
Gallatin	1	440.00	88.00	64.50	23.50
Greene	1	805.00	161.00	154.50	6.50
Grundy	1	756.75	151.35	147.60	3.75
Hamilton	1	817.00	163.40	141.30	22.10
Hancock	2	1,452.00	363.00	241.55	121.45
Hardin	1	245.00	49.00	37.50	11.50
Henderson	1	595.00	119.00	101.40	17.60
Henry	2	1,401.00	350.25	276.00	74.25
Iroquois	2	2,108.00	527.00	416.35	110.65

TABLE VII—Concluded.

County.	Class.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
Jackson	2	977.00	244.25	191.05	53.20
Jasper	1	960.00	192.00	151.05	40.95
Jefferson	2	1,100.00	275.00	230.20	44.80
Jersey	1	572.00	114.40	68.70	45.70
JoDaviess	2	883.00	220.75	202.95	17.80
Johnson	1	432.00	86.40	83.30	3.10
Kane	2	836.00	209.00	208.95	0.05
Kankakee	2	1,300.00	325.00	240.37	84.63
Kendall	1	508.00	101.60	98.10	3.50
Knox	2	1,308.85	327.21	327.72	----------------
Lake	2	850.70	212.68	192.84	19.84
LaSalle	2	2,006.00	501.50	382.03	119.47
Lawrence	1	662.00	132.40	120.35	12.05
Lee	2	1,229.00	307.25	307.88	----------------
Livingston	2	2,029.00	507.25	377.00	130.25
Logan	2	957.00	239.25	192.35	46.90
McDonough	2	1,094.00	273.50	275.60	----------------
McHenry	2	993.00	248.25	239.25	9.00
McLean	2	2,080.00	520.00	303.05	216.95
Macon	2	1,027.00	256.75	210.10	46.65
Macoupin	2	1,427.00	356.75	286.57	70.18
Madison	2	1.169.00	292.25	227.85	64.40
Marion	2	1,138.00	284.50	238.30	46.20
Marshall	1	618.00	123.60	121.02	2.58
Mason	1	798.00	159.60	122.45	37.15
Massac	1	368.00	73.60	59.05	14.55
Menard	1	506.00	101.20	94.95	6.25
Mercer	1	911.00	182.20	142.50	39.70
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1.258.00	314.50	251.40	63.10
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	97.20	26.40
Ogle	2	1,330.00	332.50	332.20	0.30
Peoria	2	1,099.75	274.93	255.35	19.58
Perry	1	706.00	141.20	128.15	13.05
Piatt	1	764.00	152.80	144.90	7.90
Pike	2	1.542.00	385.50	285.75	99.75
Pope	1	559.30	111.86	96.95	14.91
Pulaski	1	334.50	66.90	56.35	10.55
Putnam	1	270.00	54.00	45.45	8.55
Randolph	2	886.00	221.50	154.00	67.50
Richland	1	809.00	161.80	120.90	40.90
Rock Island	2	688.00	172.00	161.55	10.45
St. Clair	2	1,279.00	319.75	203.65	116.10
Saline	1	609.00	121.80	89.80	32.00
Sangamon	2	1,401.00	350.25	237.95	112.30
Schuyler	1	840.00	168.00	161.70	6.30
Scott	1	363.00	72.60	50.50	22.10
Shelby	2	1,495.00	373.75	290.10	83.65
Stark	1	531.00	106.20	112.05	----------------
Stephenson	2	1,077.00	269.25	226.30	42.95
Tazewell	2	1,010.00	252.50	213.50	39.00
Union	1	626.00	125.20	120.80	4.40
Vermilion	2	1,558.00	389.50	329.30	60.20
Wabash	1	380.00	76.00	57.90	18.10
Warren	1	990.00	198.00	135.70	62.30
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	211.05	65.15
White	2	992.00	248.00	199.93	48.07
Whiteside	2	1,130.00	282.50	251.75	30.75
Will	2	1,611.00	402.75	347.75	55.00
Williamson	2	827.00	206.75	154.65	52.10
Winnebago	2	1,025.53	256.38	252.05	4.33
Woodford	1	941.00	188.20	165.35	22.85
Total	--------	97,176.68	22,655.32	18,767.52	3,900.40

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

Class.	Number of counties.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
1	52	34,280.35	6,856.07	5,677.98	1,184.59
2	49	61,392.83	15,348.20	12,635.63	2.715.81
3	1	1,503.50	451.05	453.91	----------
Total	102	97,176.68	22,655.32	18,767.52	3,900.40

10. CITY WIDENING.—The Road and Bridge Laws have permitted State bond issue pavements to be extended through cities and villages of not more than 2,500 population, the width and material of the pavement inside the corporate limits to be the same as that outside. Frequently, it is the desire of the city or village that the width be increased, or the material changed, or both, and it is further permitted that such be done, provided the city or village bear the additional cost due to the change in width or type. A number of towns have availed themselves of this opportunity during the past several years, and in 1925 there have been an unusually large number.

In such cases, it is the practice to permit the engineer, for the city or village, to prepare plans and specifications for the entire improvement, which must meet with the approval of the Department. Where curbs are used, it is required that the width of the pavement be at least thirty (30) feet, and the type must be comparable to that used outside the corporate limits. The Department prepares an estimate of what it would cost to build a pavement of the same width and material as that outside the corporate limits, and this forms the basis of the State's share of the cost of the improvement. The remainder of the cost is paid by the city.

11. HOUSE BILL 433.—While the Road and Bridge Laws permitted building of State roads through cities and villages whose population did not exceed 2,500, it was found that there were a number of cases where towns of greater population could not afford to build pavements to connect with the State roads at the corporate limits. This resulted in a number of gaps in otherwise completed routes, and subjected the highway users to great inconvenience. In order to remedy this situation, the Fifty-fourth General Assembly enacted House Bill 433, permitting the State to construct connections with improved bond issue roads through cities and villages of more than 2,500 population, and made an appropriation of $1,000,000 therefor.

Although this appropriation became available too late to allow much work, coming under the provisions of the bill, to be done during 1925, several sections were constructed. Contracts calling for the expenditure of $134,504.67, and covering 4.95 miles of pavement were awarded in 1925. It should be noted that this sum and mileage are not included in the table of "CONTRACTS AWARDED," given in this report.

12. HOUSE BILL 536.—The same session of the General Assembly also passed an act known as House Bill 536, which provides

that any city or village of 7,500 inhabitants, or less, which has constructed, since January 1, 1922, a pavement to connect or complete a State bond issue road through said city or village shall, under certain conditions, be entitled to a refund in an amount equal to the cost of a road of the same width and materials as that outside the corporate limits, and an appropriation of $300,000 is provided for this purpose. While no refunds were made in 1925, investigations as to the eligibility of the various towns to receive this refund are being made, and it is anticipated that payments will be made in 1926.

13. REFUNDS TO COUNTIES.—Section 10 of the $60,000,000 Bond Issue Act provides that the various counties shall, under certain conditions, be reimbursed for their share of the cost of State aid paved roads incorporated in the State bond issue system. The last three sessions of the General Assembly made appropriations for this purpose, and the information upon which the bills were based was compiled by the Bureau of Design. This bureau coordinates the information required from the various bureaus in preparing certificates showing the refund due for each section utilized, and keeps a record of the status of funds due each county. In the report of the Bureau of Audits, tables giving the status of refund appropriations will be found.

14. GRADE SEPARATIONS.—During 1925 the Department continued to stress the elimination of railroad grade crossings and has accomplished more in that line than in any previous year. A number of grade separations on the bond issue system have been completed and opened to travel. In addition, settlements have been arranged on a number of proposed separations of grades for which construction can be undertaken in 1926. The Department has followed out its policy of locating State highways so as to cross railroads only where necessary, and in case a separation of grades is impossible, to cross at grade, at such a point, and in such a manner as to provide the maximum of safety possible.

Table VIII shows all grade separation cases which had been settled to date. In addition to these, there are a number of cases pending before the Illinois Commerce Commission, and numerous others for which negotiations are under way, but which have not yet been presented to the Commission.

15. RIGHT OF WAY.—The Department of Public Works and Buildings does not purchase right of way for the State roads, but expects the local agencies, benefitted by the improvement, to acquire it without cost to the State. The Department does, however, prepare all plats and dedication forms, and gives reasonable assistance to the local parties in arriving at settlements with land owners.

All dedications run to the State and are filed with the Department. Because of the large highway program, a great number of transactions are involved and an elaborate index of all dedications is necessary. Late in 1925, work was started in the preparation of a system of maps showing all right of way acquired for State bond issue

TABLE VIII—GRADE SEPARATION CASES SETTLED.

(January 1, 1919 to January 1, 1926.)

Location.				Railroad.	I. C. C. case number.	Type of crossing.	Petition filed.	Final hearing.	I. C. C. order issued.	Work completed.
Rt.	Sec.	County.	Near.							
1	11	Will	Steger	C. & E. I	9264	Under	July 9, 1922	May 10, 1922	May 25, 1922	Aug. 1923
1	F-1	Clark	Marshall	Penn	10702	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Apr. 1923
1	F	Clark	Marshall	C., C., C. & St. L	11076	Under	Oct. 28, 1920	Nov. 3, 1921	Dec. 6, 1921	Feb. 1923
1	161	Cook	Harvey	I. C		Under				1925
1	161	Cook	Homewood	I. C	13375	Over	June 25, 1923	July 19, 1923	Oct. 17, 1923	
1	35	Johnson	Ozark	I. C	12858	Under	Dec. 11, 1922	Apr. 9, 1925	May 20, 1925	July 1925
1	37	Johnson	Bloomfield	C., C., C. & St. L	12859	Over	Dec. 11, 1922	Feb. 5, 1925	May 13, 1925	Dec. 1925
1	38	Johnson	Vienna	C., C., C. & St. L	14353	Over	Aug. 7, 1924	Sept. 10, 1925	Oct. 20, 1925	*
2	14	Pulaski	Ullin	C. & E. I	12634	Under	Sept. 5, 1922	May 1, 1923	June 21, 1923	Nov. 1923
2	3	Jackson	DeSoto	M. P	12636	Under	Sept. 5, 1922	Feb. 6, 1923	Apr. 18, 1923	Dec. 1923
2	48	Macon	Decatur	I. C	13380	Under	June 26, 1923	May 22, 1924	May 14, 1924	Oct. 1924
2	3	Jackson	Wards Mine	I. C	10742	Over	June 26, 1920	May 20, 1925	June 3, 1925	*
3	67	Monroe	Columbia	M. & O	12637	Under	Sept. 5, 1922	Mar. 22, 1923	May 8, 1923	Dec. 1923
3	59	Jersey	McCluskey	C., P. & St. L	13847	Under	Jan. 30, 1924	May 8, 1924	May 14, 1924	Dec. 1924
3	7	Rock Island	Silvis	D., R. I. & N. W	14412	Under	Sept. 6, 1924	Mar. 5, 1925	Apr. 23, 1925	June 1925
3	73-S	Randolph	Evansville	M.-I	14665	Under	Dec. 19, 1924	Mar. 4, 1925	May 13, 1925	*
3	28	Warren-Mercer	Alexis Jc	R. I. Sn	15436	Under	July 28, 1925	Nov. 3, 1925	Nov. 24, 1925	Dec. 1925
4	M	Will	Joliet	E., J. & E	13923	Under	Feb. 26, 1924	Apr. 16, 1924	May 14, 1924	Aug. 1924
5	7	Cook	Spaulding	E., J. & E	12635	Over	Sept. 5, 1922	Oct. 25, 1922	Dec. 6, 1922	Nov. 1925
6	2	DuPage	West Chicago	E., J. & E	10887	Under	Aug. 13, 1920	Apr. 16, 1924	May 14, 1924	Dec. 1924
7	9	Bureau	Langley	C. & N. W	11705	Under	June 6, 1921	July 27, 1921	July 28, 1921	Feb. 1923
7	R	Bureau	DePue	N. Y. C	13666	Under	Nov. 13, 1923	July 31, 1924	Sept. 10, 1924	May 1925
7	S	Bureau	Spring Valley	C. & N. W	14959	Over	Mar. 16, 1925	July 17, 1925	July 29, 1925	*
8	8	Henderson	E. Burlington	C., B. & Q	14492	Under	Oct. 7, 1924	Nov. 2, 1925	Nov. 24, 1925	*
10	24	Morgan	Arnold	Wabash	11857	Under	Aug. 27, 1921	Nov. 23, 1922	Dec. 15, 1922	May 1923
10	21	Sangamon	Curran	C. & N. W	12460	Under	June 6, 1922	Oct. 18, 1922	Dec. 6, 1922	Dec. 1923
10	19-X	Sangamon	Riverton	I. T., Inc	13511	Under	Sept. 8, 1923	Oct. 4, 1923	Oct. 24, 1923	Sept. 1925
11	29-S	St. Clair	East St. Louis	B. & O.-Penn	10291	Under	Mar. 1, 1920	June 29, 1921	Mar. 28, 1922	Dec. 1925
11	39	Madison	St. Jacob	Penn	10705	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Dec. 1923
11	Y	Fayette	Mulberry Grove	Penn	10704	Over	June 15, 1920	Nov. 3, 1921	Nov. 9, 1921	June 1922
11	L	Effingham	Effingham	Penn	10703	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	Apr. 1923
12	17	Marion	Odin	I. C	12663	Over	Sept. 16, 1922	Sept. 8, 1925	Sept. 17, 1925	*
14	9	Hamilton	McLeansboro	L. & N	12895	Under	Dec. 28, 1922	Oct. 23, 1923	Nov. 7, 1923	Apr. 1925
14	4	Franklin	Christopher	C., B. & Q	12857	Under	Dec. 11, 1922	May 7, 1924	July 9, 1924	Aug. 1924
18	12	Kendall	Montgomery	C., B. & Q	15350	Over	July 13, 1925	Oct. 12, 1925	Oct. 21, 1925	*

TABLE VIII—Concluded.

Location.				Railroad.	I. C. C. case number.	Type of crossing.	Petition filed.	Final hearing.	I. C. C. order issued.	Work completed.
Rt.	Sec.	County.	Near.							
19	86	Cook	DesPlaines	C. & N. W.-Soo	12421	Under	July 11, 1922	Nov. 28, 1922	Apr. 25, 1923	*
22	42-A	Cook	Matteson	I. C.	12060	Under	Dec. 6, 1921	Jan. 24, 1922	Jan. 25, 1922	July 1924
22	13-D	Will	Joliet	E., J. & E.	14909	Over	Mar. 2, 1925	Mar. 13, 1925	Mar. 18, 1925	Dec. 1925
23	26-V	DeKalb	Genoa	I. C.	15130	Over	May 12, 1925	July 17, 1925	July 29, 1925	*
26	1	Stephenson	S. Freeport	C. G. W.	13590	Under	Oct. 8, 1923	Oct. 18, 1923	Nov. 21, 1923	Nov. 1923
28	6	Knox	Wataga	C., B. & Q.	13297	Under	May 31, 1923	May 7, 1924	July 9, 1924	Oct. 1924
28	11	Henry	Kewanee	C., B. & Q.	13237	Under	May 11, 1923	May 7, 1924	July 9, 1924	Oct. 1924
29	M2	Peoria	Chillicothe	A., T. & S. F.	9477	Under	Sept. 10, 1919	----------	Apr. 28, 1920	Oct. 1921
31	3	Adams	Paloma	C., B. & Q.	12459	Under	June 6, 1922	Mar. 6, 1923	Apr. 11, 1923	Sept. 1924
32	4	Moultrie	Lovington	Penn	15212	Under	June 1, 1925	Dec. 3, 1925	Dec. 15, 1925	*
37	13	Williamson	Johnson City	I. C.	12639	Over	Sept. 6, 1922	Oct. 4, 1923	Dec. 11, 1923	Dec. 1924
41	14	Knox	Galesburg	R. I. Sn.	15706	Under	Oct. 14, 1925	Nov. 4, 1925	Dec. 1, 1925	*
44	15	Kankakee	Bradley	I. C.-N. Y. C.	13591	Under	Oct. 8, 1923	June 6, 1924	Sept. 10, 1924	*

* Work not completed.

roads. It is expected that these maps will prove of great value as a complete and simple record of all right of way controlled by the Department.

16. SPECIAL REPORTS, MAPS, ETC.—The activities of the Bureau of Design also include the preparation of various maps, reports, and similar matter. In addition to making numerous route, section, county, and similar maps for the use of the Department, several maps are prepared for public information. A traffic map of the State is published for free distribution among highway users. This map shows all completed roads, sections under construction, temporary routes, and detours. It also contains brief information on the highway marking system, distance schedules, and a synopsis of the accomplishments of the State in road building.

Progress maps are published for the use of Department officials, contractors, and others who require them. These maps are used to indicate construction progress on each individual road contract.

A complete road map of Illinois was finished in 1925. This map was prepared in cooperation with the United States Geological Survey, and is undoubtedly the most comprehensive one of its kind. Every public road, as well as all railroads, streams, and incorporated places in the State, and other pertinent information is shown. The map is drawn to a scale of 4 miles to the inch, and measures 98x56 inches in size.

B. Bridge Section.

1. SELECTION OF BRIDGE TYPES.—Economy in highway bridge construction requires the selection of the proper type to meet the conditions found at each bridge site. There are many conditions which influence this selection of which the principal ones are: cost of construction, maintenance cost, life of the material used, channel requirements, and the character of the stream flow. When funds are limited, the tendency is to put too much stress on the cost of construction and not enough consideration is given to the eventual cost which involves the annual cost of maintenance and the life of the materials used.

In the selection of type, the materials should receive first consideration. The only materials available commercially in this State are: timber, steel and concrete.

The supply of timber is being rapidly depleted, the quality is becoming poor and the price is steadily increasing. Untreated timber has a very short life in this climate and for that reason it is not an economical material to use for bridges. With a preservative treatment of creosote oil, the life of timber may be extended twenty to twenty-five years, but the treatment increases the cost, and the life so secured does not compare favorably with the more permanent materials available. Therefore, the use of lumber should be restricted to structures of a temporary nature.

Steel, in the various structural shapes, is used extensively and is adapted to spans of all lengths. It has been established, by comparing estimates and contractor's bids on many jobs, that steel and concrete are quite often on a par, in so far as first cost is concerned. Steel involves considerable maintenance cost for cleaning and repainting every four or five years, but there is practically no maintenance required for concrete structures. This is a vital element in the determination of whether steel or concrete is the proper material to use. Except where the foundations are unusually difficult and expensive, or the spans are very long, it is usually true that concrete is more economical than steel in the final analysis. In this State it is the general practice to use steel only when the individual span lengths must be more than 65 feet. The length required for individual spans is sometimes controlled by channel requirements for navigation and stream flow conditions, which involve the velocity of flow and the prevalence of ice and drift. These elements may indicate span lengths of more than 65 feet and therefore the use of steel.

When span lengths are determined by comparative costs, it is usually found that the economic span length lies within the limit for reinforced concrete. There are several types of concrete bridge structures in general use, namely: box culverts, slabs, through girders, deck girders and arches. Box culverts are suitable for spans up to 12 feet; slabs for spans from 10 to 30 feet; through and deck girders for spans from 30 to 65 feet; and arches for spans from 30 feet upward. In general, the economic span length will not exceed twice the height from top of roadway to bottom of foundations, and in many cases it is less. Where the size of waterway necessary is sufficient to require several spans, the proper type of structure will be determined by the height and cost of the substructure. If the height is low and no other elements enter, a battery of box culverts may prove most economical. As the height of substructure increases, the economical span length will run through the permissable limits of slab construction and to through or deck girders. Through girders are not as economical as deck girders, but they are designed for use where clearance above high water is limited. The arch bridge presents the most pleasing appearance of any of the types in general use, but it must be confined to locations where the foundation material is suitable. When there is ample clearance above high water, and where the appearance of the finished structure is of sufficient value to offset a slight increase in cost as compared with other types of concrete bridges.

2. COUNTY AND STATE BRIDGE PROGRAM.—Table IX shows a summary of the County and State bridge work, carried on from 1906 to 1925, inclusive. Bridges and culverts, built in connection with State Aid, Federal Aid and State Bond Issue work, are not included in the work shown in this table, as such structures are included in the reports on road construction.

TABLE IX—SUMMARY OF BRIDGE WORK TO DECEMBER 31, 1925.

Year.	Plans and specifications prepared.	Estimated cost.	Contracts let on State plans.	Contract price.	Foreign plans approved.
1906	15		11	$ 37,035.00	Plans prepared by County Superintendent of Highways and others outside of Division of Highways.
1907	113		48	41,519.00	
1908	149		64	165,674.00	
1909	122		92	133,285 00	
1910	203		141	148,432.00	
1911	241		127	238,903.00	
1912	214		150	212,694.00	
1913	238	$ 342,052.00	139	200,834.00	5
1914	269	470,363.00	109	184,792.00	269
1915	707	984,420.00	565	541,509.00	230
1916	735	1,169,743.00	439	566,657.00	653
1917	480	812,614.00	502	582.993.00	503
1918	206	499,702.00	169	277,130.00	443
1919	231	761,458.68	202	514,897.00	725
1920	443	2,841,896.22	301	2,208,494.84	261
1921	384	2,134,476.49	337	1,909.455.67	362
1922	374	2,365,726.45	317	1,775,066.00	839
1923	484	3,359,109.03	413	3,170,269.46	1,451
1924	420	4,220,819.17	258	1,594,035.90	886
1925	340	2,972,560.80	283	2,940,774.86	1,215
Total	6,368	$22,934,940.84	4,667	$17,444,450.73	7,842

3. COMPLETE BRIDGE PROGRAM FOR 1925.—Table X shows the bridge work, carried on from January 1, 1925 to December 31, 1925, classified according to the funds used. The average cost of preparing plans and specifications was 1.981 per cent of the estimated cost of the work.

TABLE X—CLASSIFICATION OF BRIDGE WORK FOR 1925.

Classification.	Plans prepared.		Contracts awarded.		
	No.	Estimated cost.	No.	Estimated cost.	Contract price.
County bridges	201	$ 585,234.44	139	$ 360,710.36	$ 303,027.55
State bridges	139	2,387,326.36	144	2,991,495.80	2,637,747.31
In State road contracts	2,480	963.729.28		With pavement.	
Total	2,820	$3,936,290.08	283	$3,352,206.16	$2,940,774.86

4. SPECIAL BRIDGE WORK—The activities of the Bridge Section, from January 1, 1925 to December 31, 1925, also included the following:

Plans checked and approved for County Superintendent of Highways	1,215
Existing bridges analyzed for strength	25
Shop drawings for steel bridges checked	35
Shop inspection for steel bridges	31

5. CONCRETE BRIDGE COSTS.—Figure 8 shows the average cost of concrete bridge work from 1907 to 1925. The cost per cubic yard includes reinforcing steel, cement and all other items of construction cost. This curve shows the rapid increase in prices during and for two years after the World War, also the drop in prices when the effects of the war had worn off. During 1923, 1924 and 1925, the variation was small, indicating that prices are becoming more stable and the conditions in the construction industry more nearly normal.

6. DESCRIPTION OF BRIDGE PHOTOGRAPHS.—Figure 9 shows the DesPlaines River bridge at Lyons, on State Bond Issue Route

4. This bridge provides a new entrance to Chicago for traffic from Joliet and consists of reinforced concrete deck girders, seven 50-foot spans with a 36-foot roadway and two 5-foot sidewalks. Contract price $50,600.00.

Figure 10 shows the First Avenue bridge across the Rock River at Sterling. This bridge was completed in 1924, and consists of open spandrel arches, twelve spans at 80 feet, 6 inches each, with a 28-foot roadway and two 7-foot sidewalks. Contract price $169,977.00.

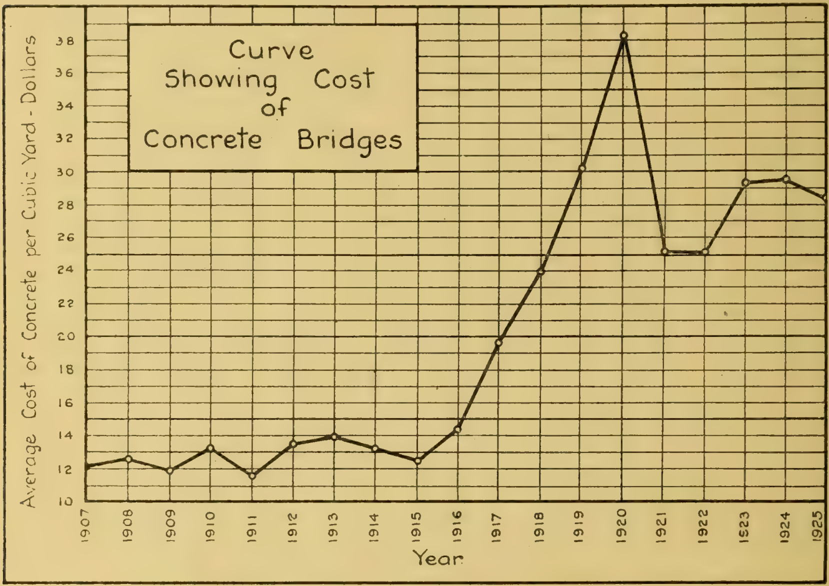


Figure 8.—Curve showing the average cost of concrete bridge work from 1907 to 1925. The cost per cubic yard includes reinforcing steel, cement and all other items of construction cost.

Figure 11 shows the DesPlaines River bridge at Summit, on State Bond Issue Route 46. This bridge is an important gateway to Chicago from the south and east and consists of steel plate girders with concrete deck, seven spans of 55 feet each, with a 30-foot roadway. Contract price $100,950.00.

Figure 12 shows the Blackhawk bridge over the Kishwaukee River in Cherry Valley Township, Winnebago County. It is located on the State Aid system of Winnebago County and was built by the county as Section 27-15d. It consists of concrete deck girders, seven 65-foot spans, with an 18-foot roadway. Contract price $45,970.00.

Figure 13 is a construction view of the bridge across the Kaskaskia River at Evansville, on State Bond Issue Route 3. This bridge forms the last link in the concrete highway from East St. Louis to Chester. This picture was taken in December, 1925 and shows the erection of one of the steel spans and the cofferdam for the last pier. When completed, this bridge will consist of four 160-foot steel spans, one 95-foot steel span and nineteen 50-foot concrete deck girder spans, all with

22-foot roadway. Concrete required—5,322 cubic yards. Steel—structural and reinforcing, 1,609,050 pounds. Contract price $221,950.00.

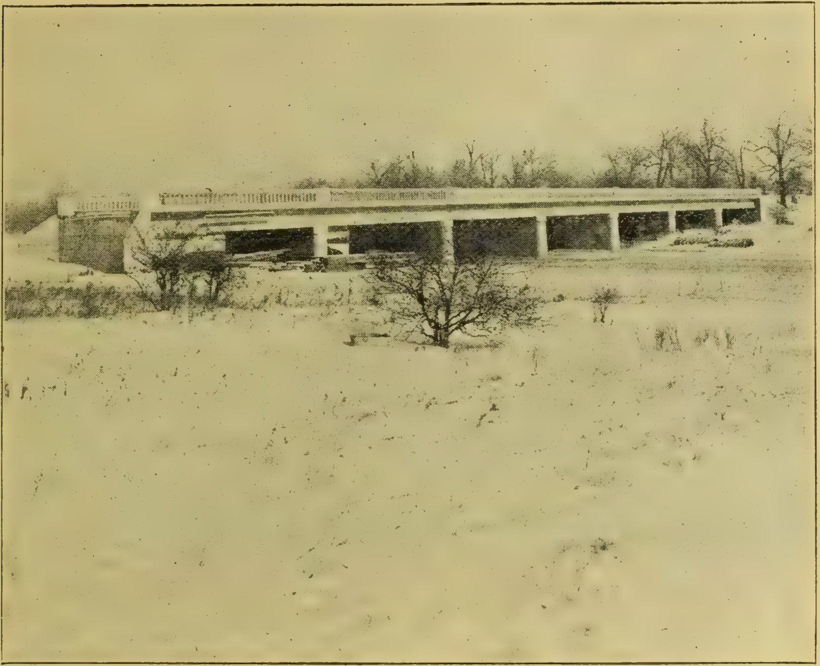


Figure 9.—DesPlaines River Bridge at Lyons, on State Bond Issue Route 4.

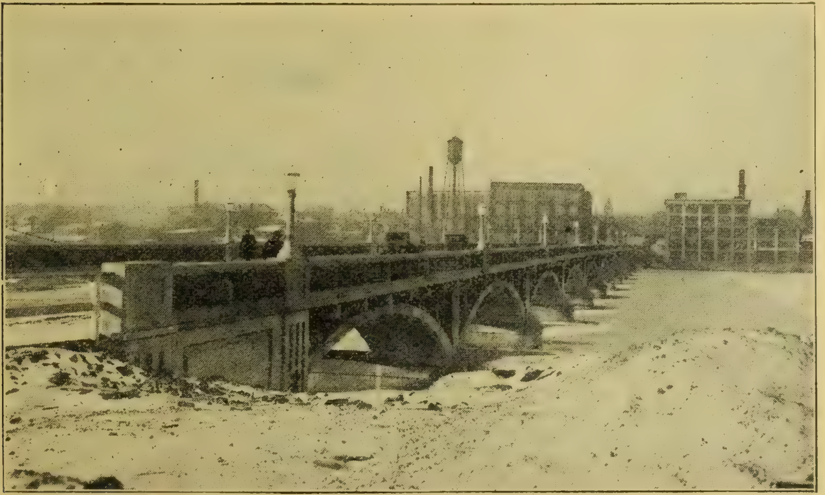


Figure 10.—First Avenue Bridge across the Rock River at Sterling.

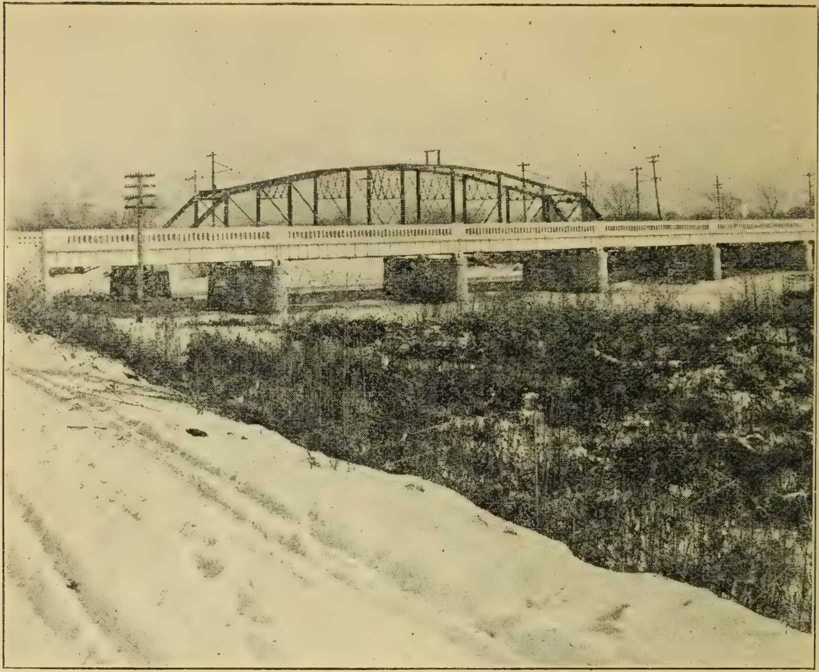


Figure 11.—DesPlaines River Bridge at Summit, on State Bond Issue Route 46.

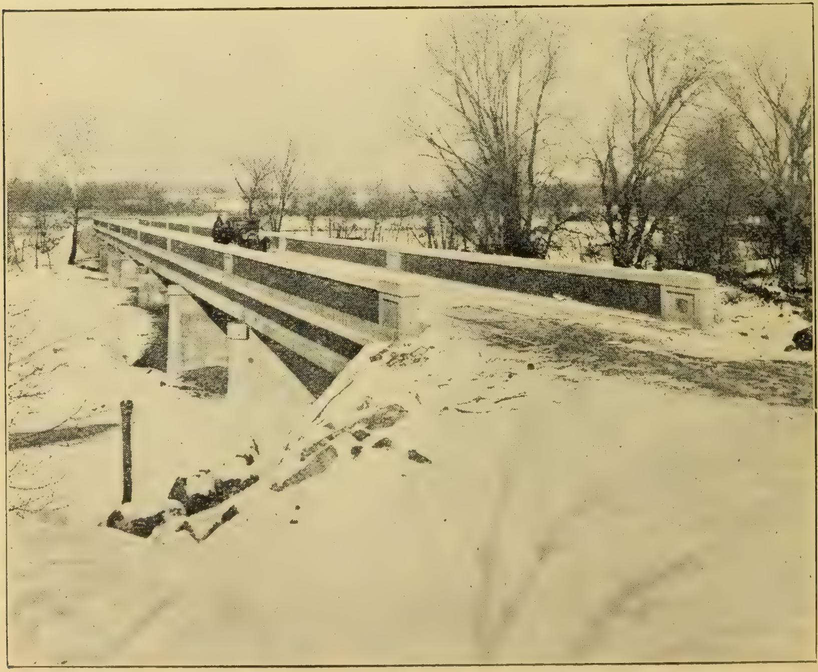


Figure 12.—Blackhawk Bridge over the Kishwaukee River in Cherry Valley Township, Winnebago County.

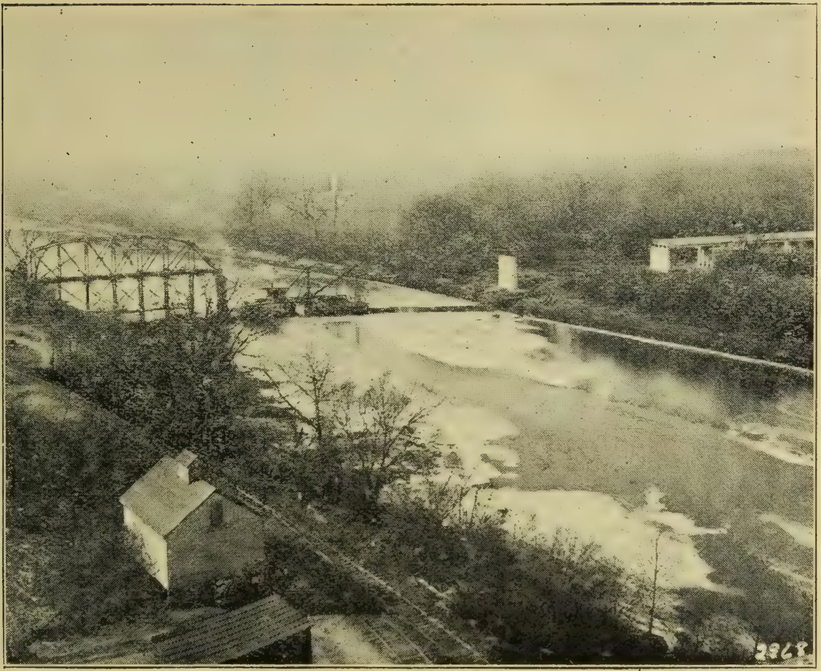


Figure 13.—A construction view of the bridge across the Kaskaskia River at Evansville, on State Bond Issue Route 3.

III. BUREAU OF CONSTRUCTION.

1. CONSTRUCTION PROGRAM FOR 1925.—During 1925, there was completed 906.4 miles of pavement, classified as follows:

Portland cement concrete	882.8 miles
Brick	9.1 miles
Macadam and gravel	14.5 miles
Total	906.4 miles

Of this total, 786.9 miles were on the State bond issue system, and 119.5 on the State aid system constructed by the counties under Section 15d of the Road and Bridge Law.

Figure 14 shows the weekly progress in pavement construction in 1925, while a comparison of the progress of pavement construction from 1920 to 1925 is shown in Figure 15.

In addition to the pavement, there was completed 197.1 miles heavy grading totaling 3,200,254 cu. yds. of earth work, and 154 bridges, totaling 62,737 cu. yds. of concrete.

Table No. XI shows further data pertaining to the miles constructed during 1925 and Table No. XII gives a general summary of 1925 construction.

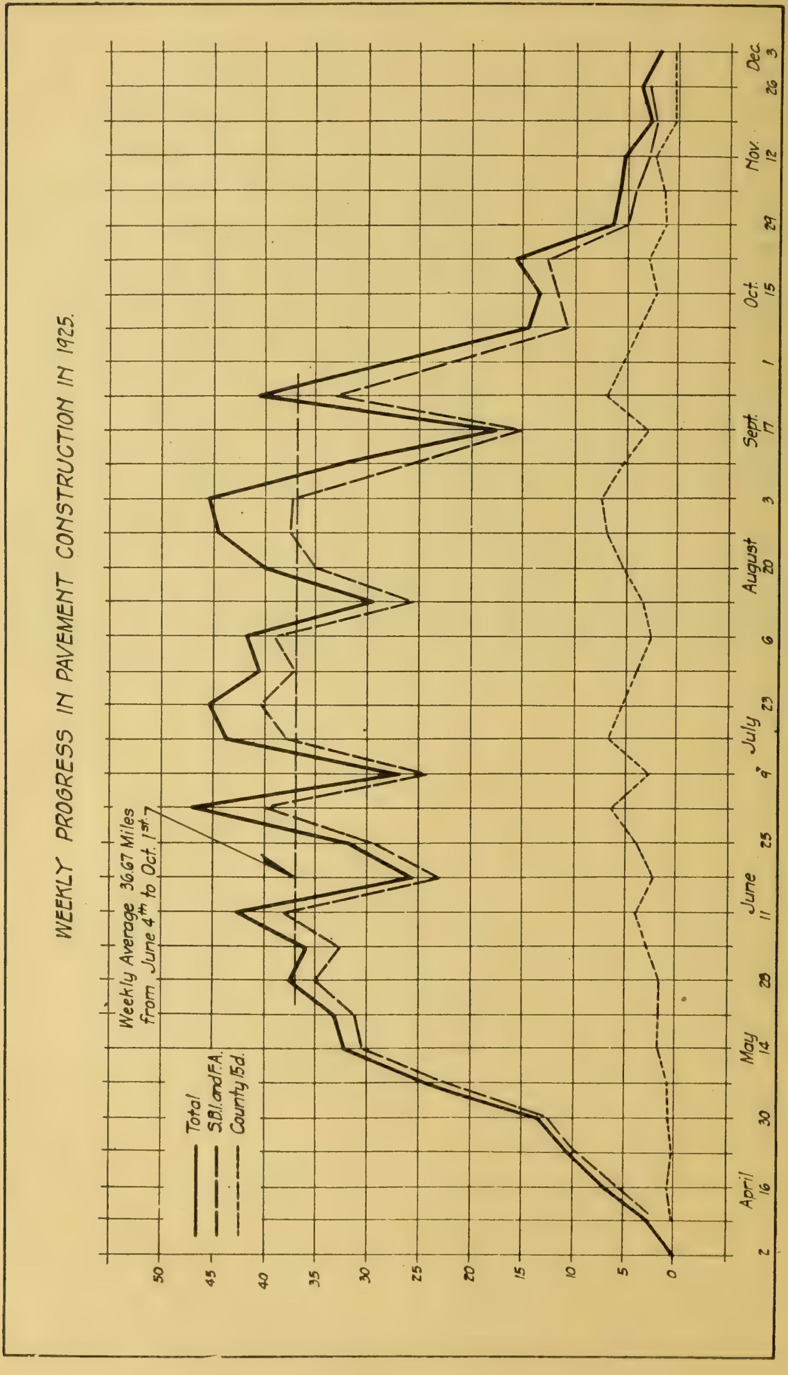

WEEKLY PROGRESS IN PAVEMENT CONSTRUCTION IN 1925.
Total
S.B.I. and F.A.
County Bd.
Weekly Average 36.67 Miles from June 4th to Oct. 1st
50
45
40
35
30
25
20
15
10
5
0
April
2
16
30
May
14
28
June
11
25
July
9
23
6
August
20
3
Sept.
17
1
Oct.
15
29
Nov.
12
26
Dec.
3

Figure 14.

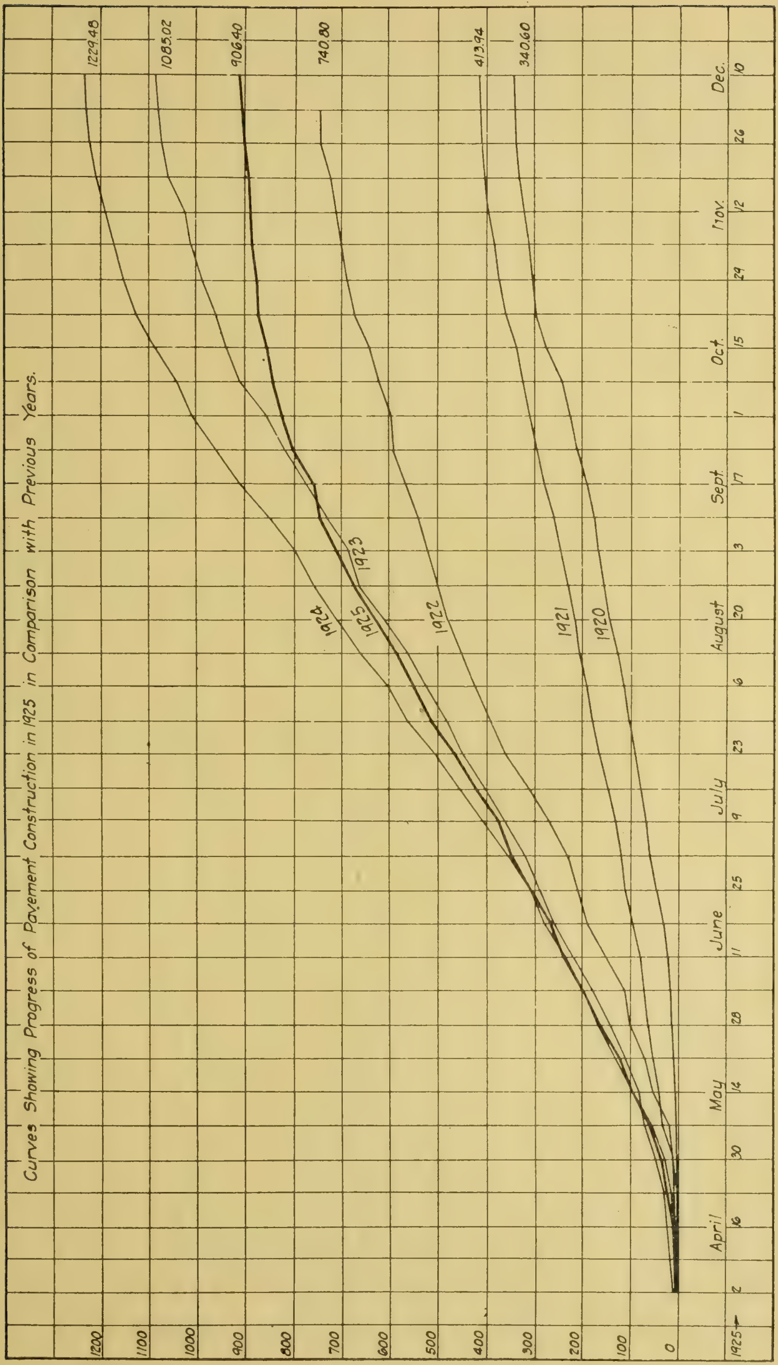

Curves Showing Progress of Pavement Construction in 1925 in Comparison with Previous Years.
1229.48
1085.02
906.40
740.80
413.94
340.60
1920
1921
1922
1923
1924
1925
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
1925 →
2
April
16
30
May
14
28
June
11
25
July
9
23
August
6
20
Sept.
3
17
Oct.
1
15
29
Nov.
12
26
Dec.
10

Figure 15.

TABLE XI—SUMMARY OF MILES CONSTRUCTED DURING 1925.

	Pavement—miles.	Grading—miles.	Bridges—number.
Carried over from 1924	34.23	26.94	34
Awarded during 1925	1,026.63	196.14	173
Additions to existing contracts during 1925	7.91	8.30	3
Total for 1925	1,068.77	231.38	210
Constructed during 1925	906.40	197.08	154
Carried over to 1926	162.37	34.30	56

NOTE.—The total pavement awarded during 1925 includes 4.95 miles awarded under House Bill 433. The total pavement constructed in 1925 does not include the 2.15 miles for miscellaneous work built by special appropriations.

TABLE XII—GENERAL SUMMARY OF 1925 CONSTRUCTION.

Paving contractors, including 15d work	108
Grading contractors, including 15d work	59
Bridge contractors, including 15d work	72
Total number of paving, grading and bridge contractors having State or county work	239
Paving sections under contract: State Bond Issue and Federal Aid, 222; County 15d, 76; miscellaneous, 2; total	300
Non-rigid type pavement sections: Macadam, 3; gravel, 7; Kentucky Rock Asphalt, 4; total	14
Grading sections under contract: S. B. I., 75; 15d, 37; total	112
Bridge sections under contract: S. B. I., 113; 15d, 38; total	151
Number of paving mixers operating on State and county work: S. B. I., 99; 15d, 31; total	130
Number of paving mixers operated with industrial railway: S. B. I., 21; 15d, 1; total	22
Number of paving mixers operated with trucks: S. B. I., 76; 15d, 30; total	106
Number of paving mixers operated with wheelbarrows: S. B. I.	2
Number of paving mixers operated from central proportioning plants: S. B. I., 91; 15d, 29; total	120
Number of paving mixers operated from central mixing plants: S. B. I., 8; 15d, 2; total	10
Largest day's run in feet	1,501
Largest week's run in feet	7,872
Largest month's run in feet	22,325

Seven thousand men and 1,500 teams were employed directly in the construction of road and bridge work this year.

2. COST OF 18-FOOT CONCRETE PAVEMENT.—Information compiled from 203 miles of 18-foot concrete pavement, consisting of sections taken from all parts of the State and including all heavy grading and bridge contracts on these sections, shows a cost distribution as shown in Figure 16.

Note: Miscellaneous includes guard fence, catch basins, section markers, gutters, and all extra work not included under other headings.

3. WEATHER AND LABOR CONDITIONS—1925—Weather conditions during the spring and summer months were very satisfactory and excellent construction progress was maintained. September and October, however, were abnormally wet and in November a cold wave followed, which closed the construction season. As a consequence, approximately 100 miles of paving and considerable bridge work were left uncompleted. Labor conditions were satisfactory throughout the season and the rail transportation situation was normal, a condition which has not existed for several years.

4. CONSTRUCTION ACCOMPLISHMENTS.—The 1925 construction program was marked by the following accomplishments: the completion of many important gaps, opening many miles of pavement to traffic which have been limited in serviceability during inclement weather because of such gaps; the widening of several pieces of narrow pavement, notably State Bond Issue Route 1 in the vicinity of Watseka and Danville; the completion of Route 46, the outer belt line around Chicago, with the exception of a few miles of work; the completion of a number of grade separations, including two in East St. Louis on Routes 3 and 11, one at Odin on Route 12, one near Springfield on Route 10, and several in the vicinity of Chicago; and, with a few exceptions, the completion of the heavy grading and bridge construction on the entire $60,000,000 system.

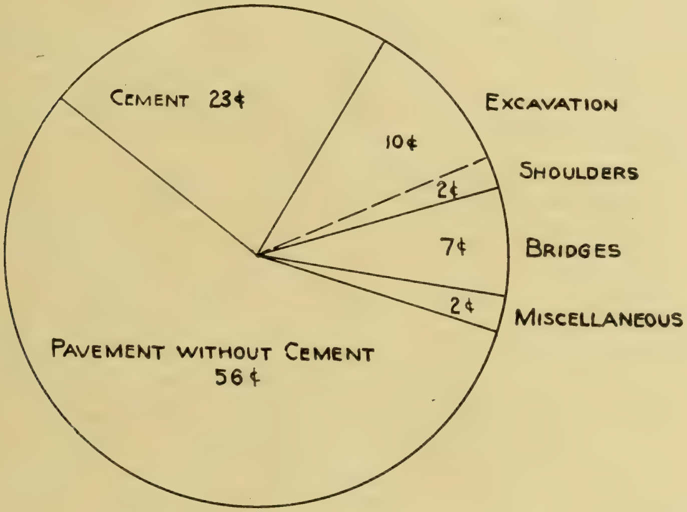


Figure 16.—Cost analysis diagram of 18-foot concrete pavement.

5. CONSTRUCTION POLICIES.—There were several important changes in the specifications as shown in the report of the Bureau of Design. Several important construction policies were continued or developed, namely: service to through traffic, by systematic maintenance of detours and temporary roads; the development and application of a method of checking pavement thickness, insuring control of this feature; important investigations relative to the paving and maintenance of heavy fills; cooperation with equipment manufacturers and contractors to standardize road building equipment.

6. ILLINOIS CONTRACTING ORGANIZATION.—The policy of cooperating with contractors by frequent conferences and field investigations was continued with good results. A number of new contractors entered the State during the year and, in general, qualified satisfactorily. The contractors have shown a desire to assist in the

elimination of irresponsible bidders, and to cooperate with the Department in fulfilling the requirements for quality and performance. It is evident that there now exists in Illinois a contracting organization fully capable of handling 1,500 miles of paving work per year, as well as the necessary amount of grading and bridge work. The bids received indicate that the contractors have carefully studied their organi-

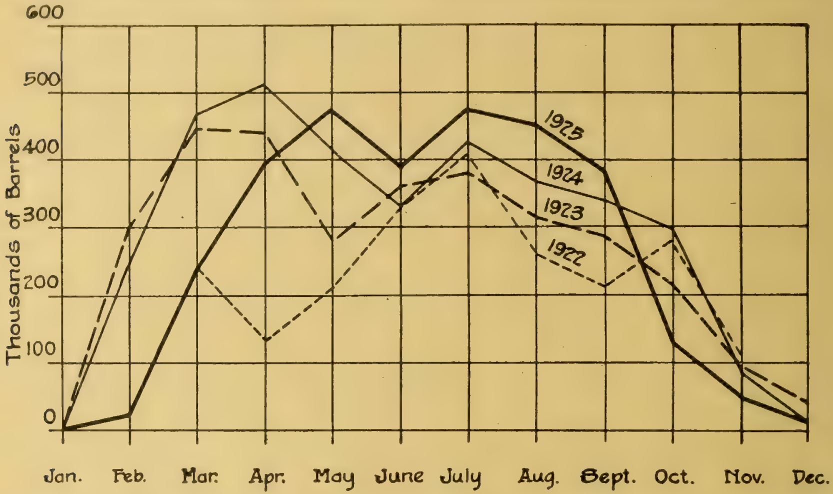


Figure 17.—Comparative curves—monthly cement shipments, 1922, 1923, 1924 and 1925.

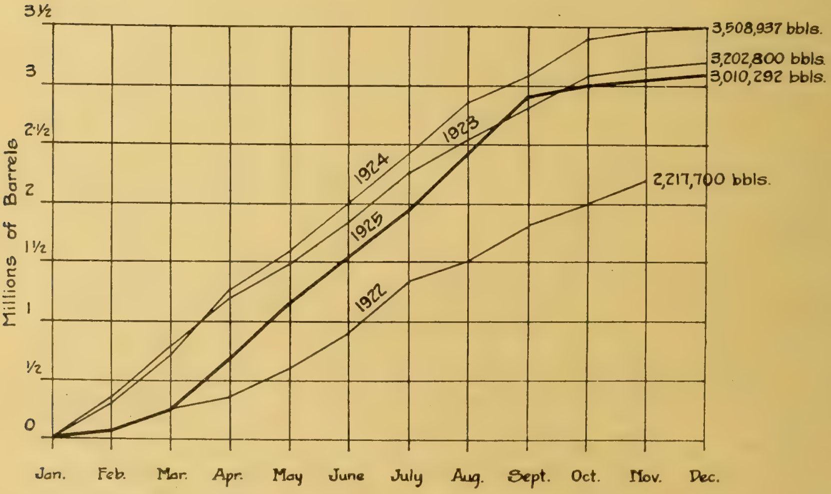


Figure 18.—Comparative curves—accumulative total of cement shipments, 1922, 1923, 1924 and 1925.

zation and operation efficiency, and that they are in a position to perform work at a satisfactory figure and still make a reasonable profit.

7. MATERIAL RESOURCES.—Large quantities of cement were stored during the months of February, March, and April, and during the season, there was no evidence of shortage. The same was essentially true of aggregates. Apparently, the material producers, in view of the large construction programs throughout this country, have developed their resources so as to meet the requirements. It is also apparent that the railroad companies, by careful study of yearly tonnage and shipping requirements, have developed a normal shipping schedule for all commodities.

Figure 17 shows comparative curves for monthly cement shipments from 1922 to 1925, while Figure 18 shows comparative curves for accumulative total of cement shipments from 1922 to 1925, inclusive.

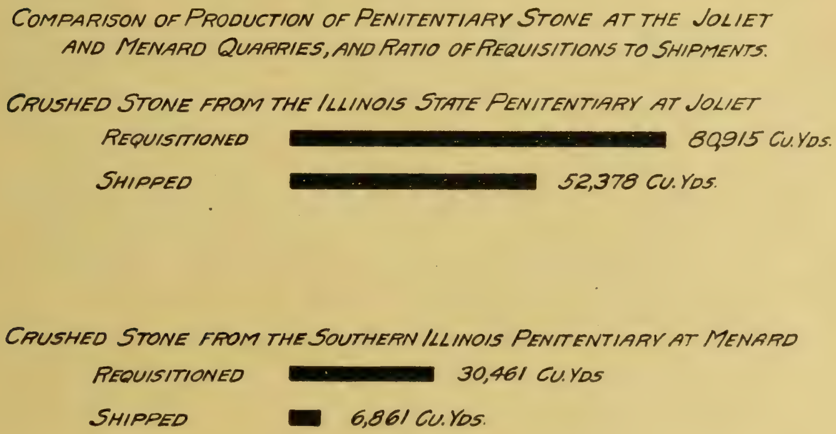


Figure 19.

8. DAY LABOR CONSTRUCTION.—Construction by the day labor organizations was continued during 1925, three outfits being employed on jobs of average length and one on short gaps. They completed 36.5 miles of concrete and 2.8 miles of gravel. Each outfit is now equipped with standard road building machinery, and is operated essentially the same as those on the average contract job. It is felt that the day labor method is justified for the following reasons: to obtain a comparison with contract work under average working conditions; to develop new design and construction ideas, and to study new equipment and its practical operation; to build short sections where the contractor's overhead and safety factor would necessarily prohibit a reasonable bid; and, to construct sections which have certain peculiar physical or construction difficulties, for which contract work would be high because of risk.

9. PENITENTIARY STONE.—The two penitentiaries shipped 59,239 cubic yards of stone for township work, and there were requests for 111,376 cubic yards which could not be filled. The penitentiaries were able to ship only 53 per cent of the total amount requested. Estimating the average price of crushed stone at from $1.00 to $1.25 per cubic yard at commercial plants, the saving to the townships of the State able to avail themselves of penitentiary stone, is significant.

Figure 19 shows a comparison of production of penitentiary stone at the Joliet and Menard quarries, and ratio of requisitions to shipments.

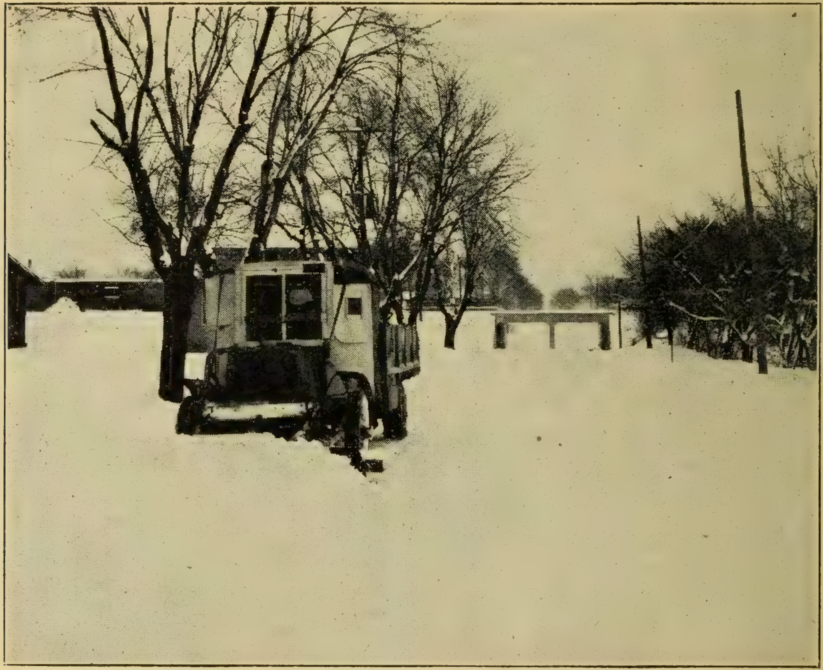


Figure 20.—Snow removal on Bond Route 18, in Naperville, DuPage County.

10. RATE SCHEDULE SURVEY.—During 1925 the bureau cooperated with the State Commerce Commission in making a careful survey of rate schedules, fostering lower rates when practical and protesting against the increases when justifiable. A record of the cases thus handled shows a saving of many dollars through rate adjustments, which saving will, of course, mean additional mileage on our road program.

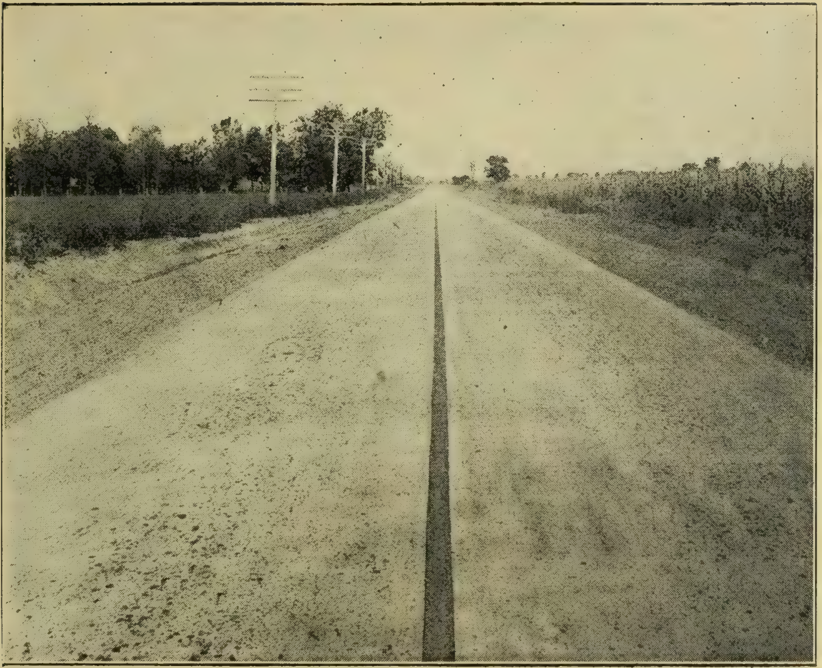


Figure 21.—Bond Route 19 near Crystal Lake, McHenry County.

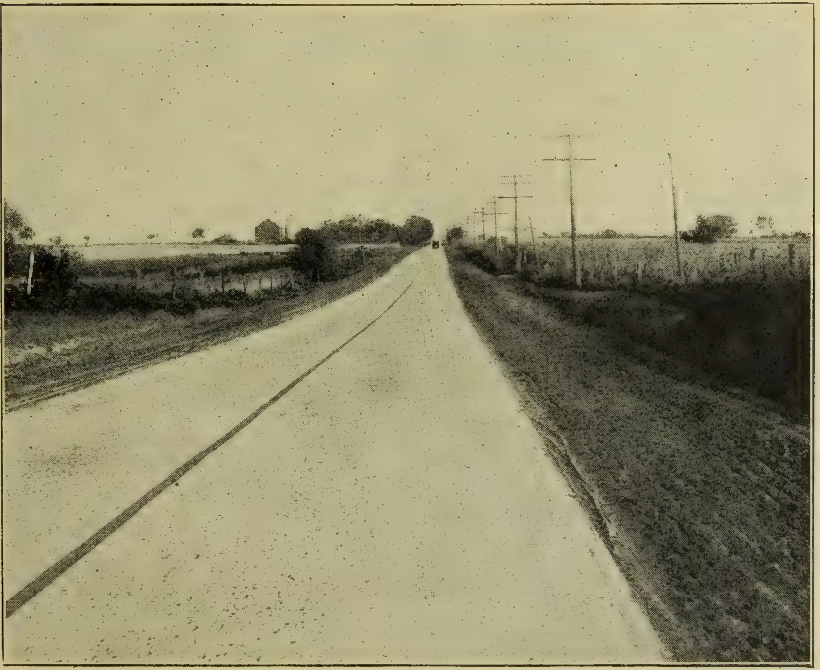


Figure 22.—Bond Route 21 north of Gray's Lake, Lake County.

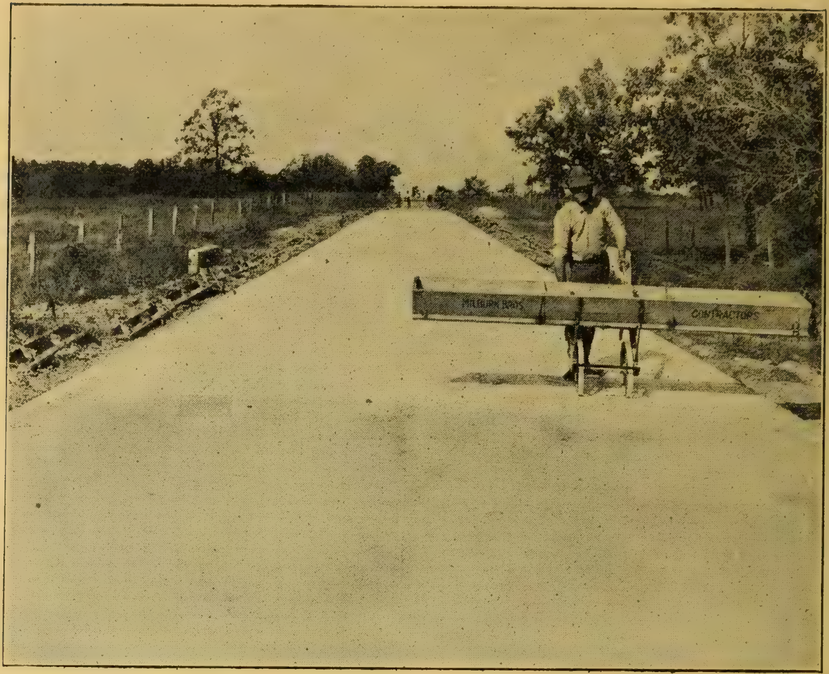


Figure 23.—Applying calcium chloride as a curing agent on Bond Route 19, south of Harvard, McHenry County.

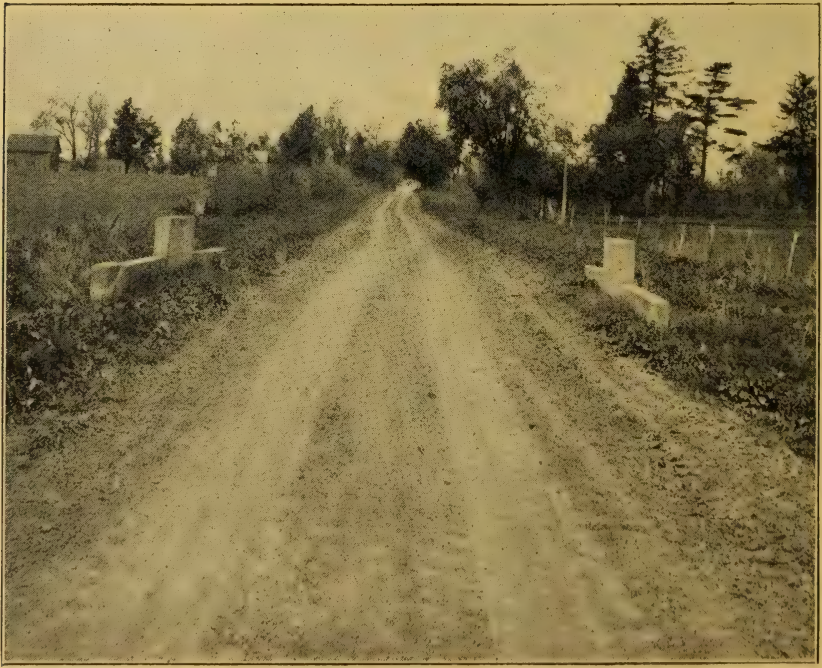


Figure 24.—Before construction: Bond Route 9 north of Ellsworth, McLean County.

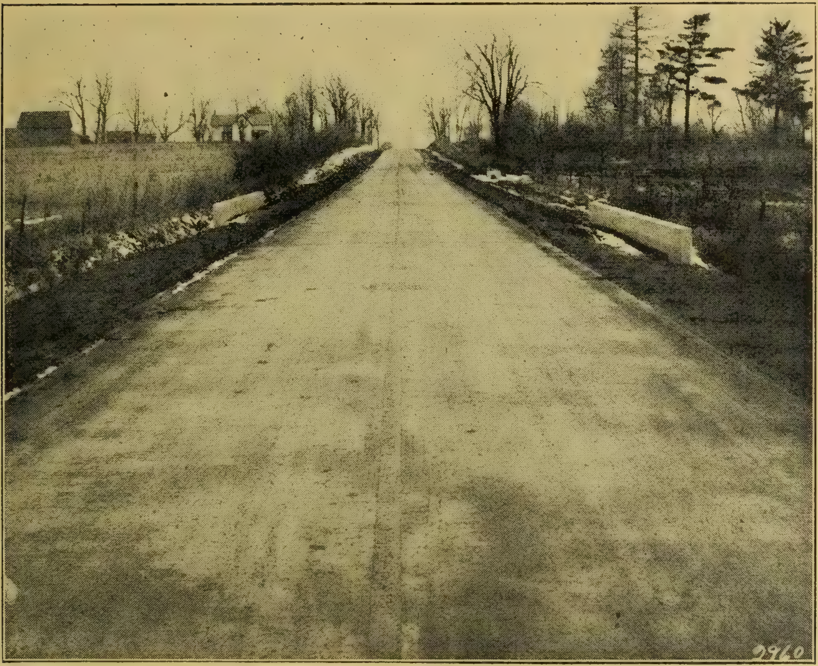


Figure 25.—After construction: Bond Route 9 north of Ellsworth, McHenry County.

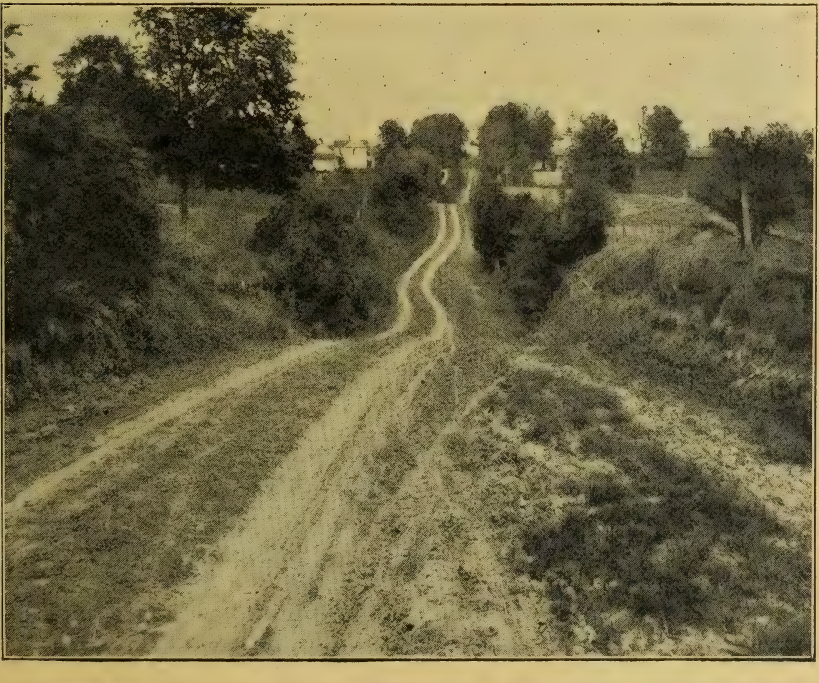


Figure 26.—Before construction: Bond Route 31 near Ripley, Brown County.

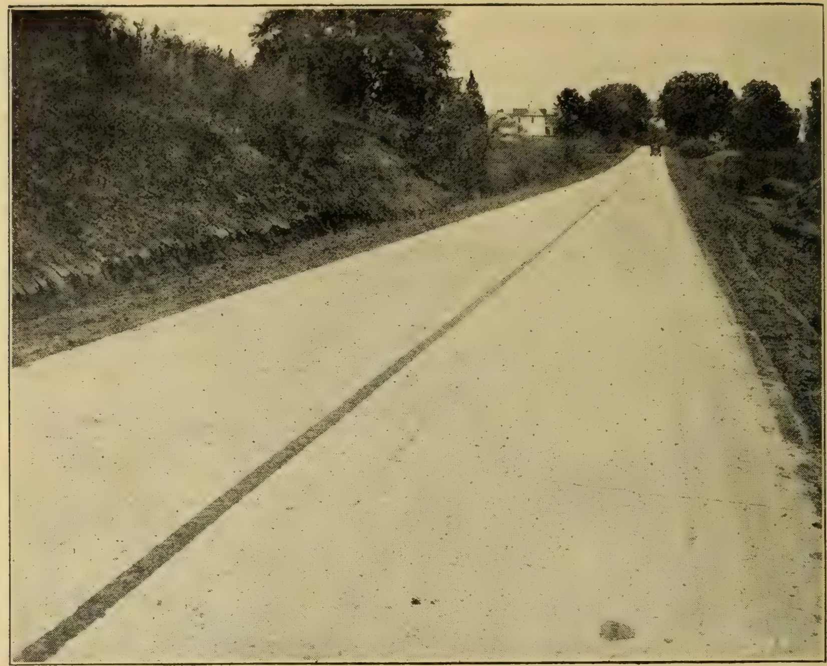


Figure 27.—After construction: Bond Route 31 near Ripley, Brown County.

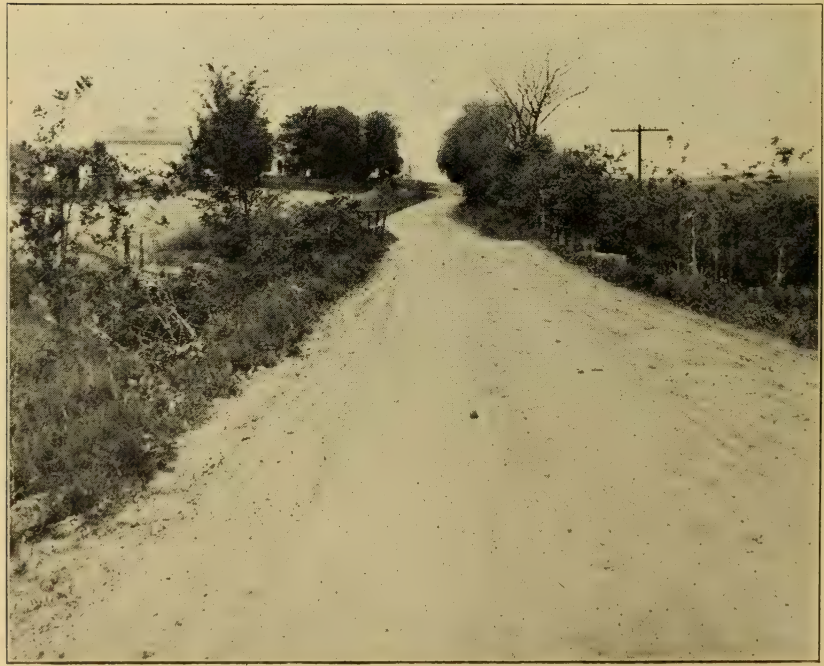


Figure 28.—Before construction: Bond Route 36 south of Ursa, Adams County.

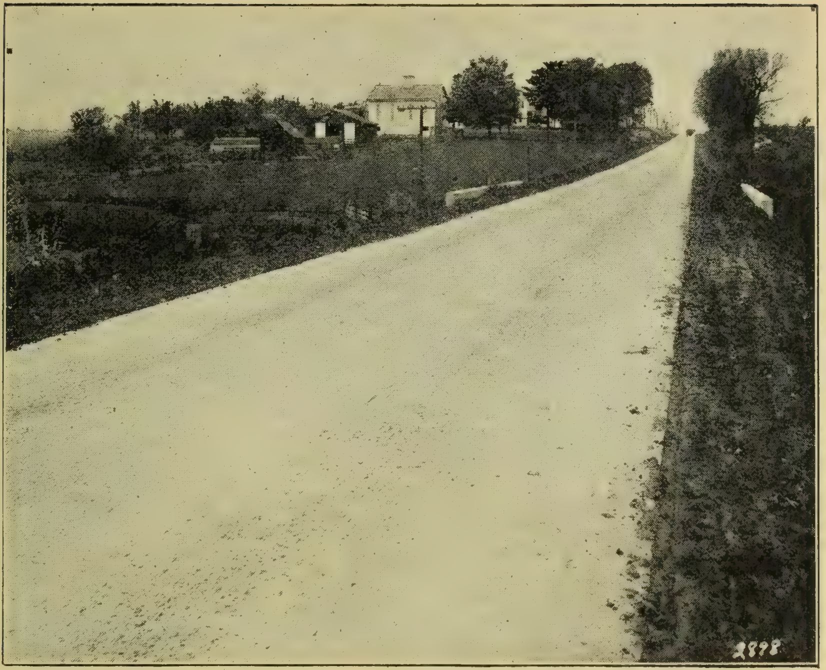


Figure 29.—After construction: Bond Route 36 south of Ursa, Adams County.

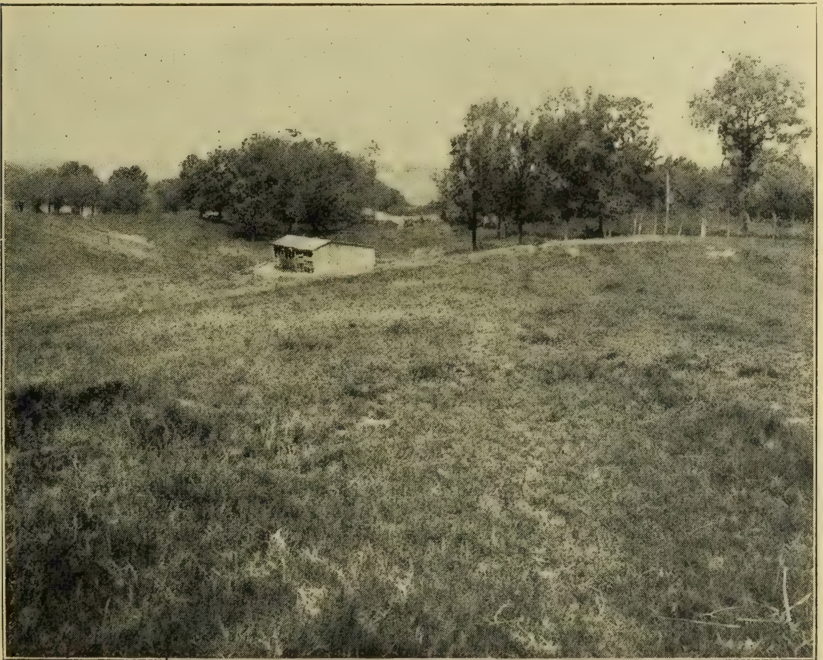


Figure 30.—Before construction: A relocation on Bond Route 36 west of Pittsfield, Pike County.

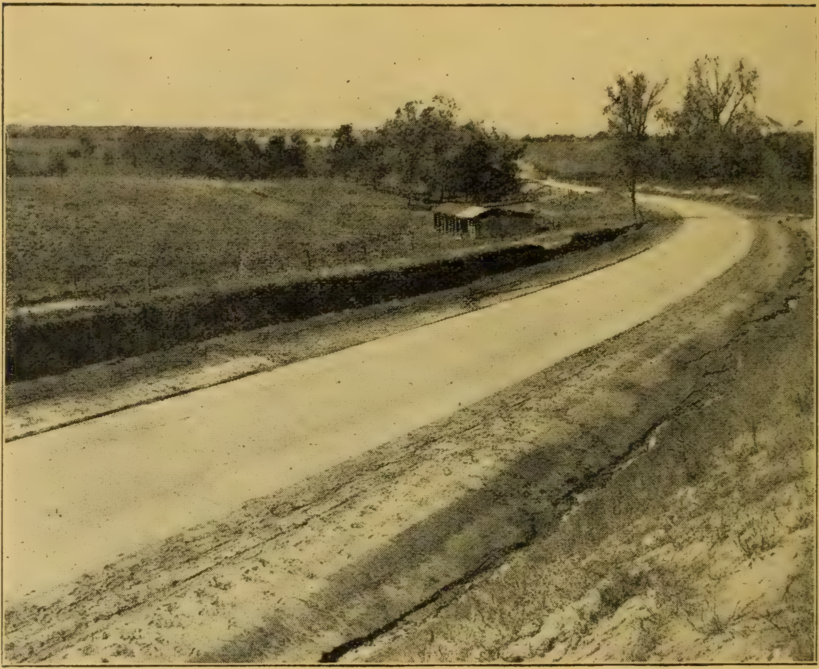


Figure 31.—After construction: A relocation on Bond Route 36 west of Pittsfield, Pike County.

IV. BUREAU OF MAINTENANCE.

1. ORGANIZATION AND DUTIES.—The Bureau of Maintenance is organized to perform:

a. Maintenance of Surfaced Roads.
b. Maintenance of Detours, Unpaved and Temporary Routes.
c. Construction of Additions and Betterments.
d. Reconstruction.
e. Policing of the State Highway System.

Geographically, the State is divided into nine districts, with a separate organization in each district. The maintenance of surfaced roads and detours is handled largely by the patrol system, supplemented by the gang system where necessary. Patrolmen perform this work under the direction of supervisors who are responsible to the District Maintenance Engineer. The District Maintenance Engineer is responsible to the District Engineer, and each District Engineer reports to the Engineer of Maintenance at Springfield, the administrative officer of the Bureau of Maintenance.

Materials used for the maintenance of surfaced roads or detours are purchased on quantities, under requisitions issued by the Engineer of Maintenance, wherever possible, so that special prices and discounts may be secured. Field forces are not permitted to incur indebtedness, on any single item in excess of $25.00, without the permission of the Springfield office. All labor employed to assist the patrolmen in the performance of their duties is approved by the supervisor, and where an unusual amount of help is required, the approval of the District Engineer is required. No funds are expended for the construction of Additions or Betterments without securing the authority of the Engineer of Maintenance, thus enabling him to retain control over the construction of such items and the amount of funds involved. All bills for purchases in the field by the patrolmen are approved by the district office, then forwarded to the Springfield office where they are examined for prices and unusual items before being sent to the Bureau of Audits for payment.

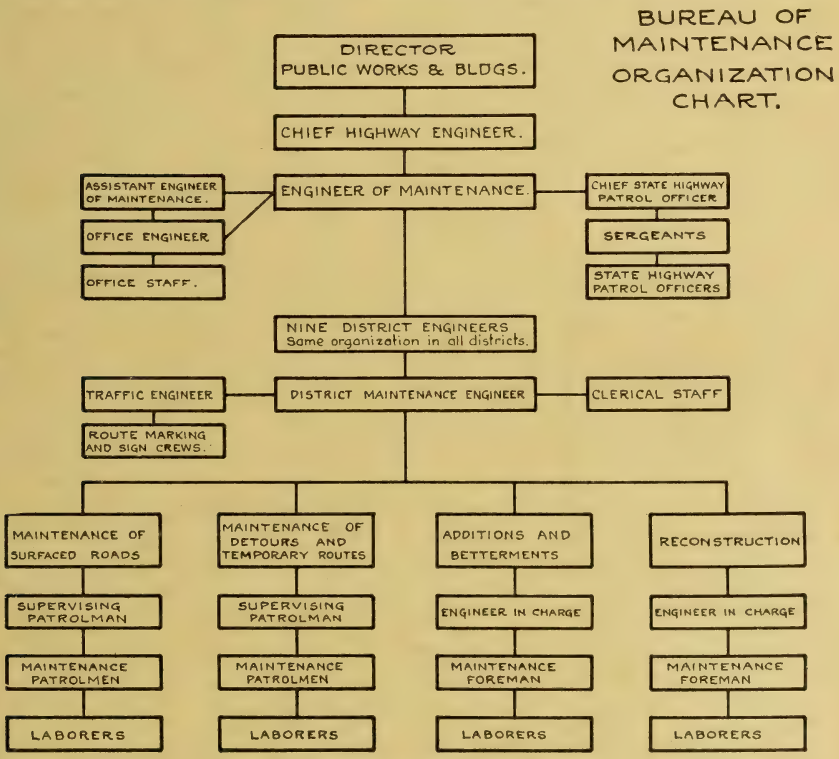

BUREAU OF MAINTENANCE ORGANIZATION CHART.
DIRECTOR PUBLIC WORKS & BLDGS.
CHIEF HIGHWAY ENGINEER.
ASSISTANT ENGINEER OF MAINTENANCE.
ENGINEER OF MAINTENANCE.
CHIEF STATE HIGHWAY PATROL OFFICER
OFFICE ENGINEER
SERGEANTS
OFFICE STAFF.
STATE HIGHWAY PATROL OFFICERS
NINE DISTRICT ENGINEERS Same organization in all districts.
TRAFFIC ENGINEER
DISTRICT MAINTENANCE ENGINEER
CLERICAL STAFF
ROUTE MARKING AND SIGN CREWS.
MAINTENANCE OF SURFACED ROADS
MAINTENANCE OF DETOURS AND TEMPORARY ROUTES
ADDITIONS AND BETTERMENTS
RECONSTRUCTION
SUPERVISING PATROLMAN
SUPERVISING PATROLMAN
ENGINEER IN CHARGE
ENGINEER IN CHARGE
MAINTENANCE PATROLMEN
MAINTENANCE PATROLMEN
MAINTENANCE FOREMAN
MAINTENANCE FOREMAN
LABORERS
LABORERS
LABORERS
LABORERS

Figure 32.

The highway patrol organization is composed of 78 officers and 12 sergeants who report to the chief highway patrol officer at Kankakee. He, in turn, is responsible to the Engineer of Maintenance. The police organization has no connection with the district organization and has for its duties the policing of the State Highway System and enforcement of the provisions of the Motor Vehicle Act.

2. OUTLINE OF ACTIVITIES—1925.—During the calendar year 1925, the Bureau of Maintenance maintained 4,666.17 miles of surfaced roads, consisting of the following:

4,256.49	miles Portland Cement Concrete
34.23	miles Bituminous Concrete
153.65	miles Brick
30.20	miles Bituminous Macadam
39.27	miles Waterbound Macadam
152.33	miles Gravel
4,666.17	miles total.

The work of maintaining these types consists of the repair of the pavement slab, the filling of ruts and washes in shoulders, cleaning culverts and ditches, cutting weeds and vegetation, cleaning traveled way, the repair and replacement of route markers and safety signs, repair and replacement of guard fence, cleaning and repainting of bridges, painting traffic lines and removing snow.

The Bureau also maintained 1,299.75 miles of detours, unpaved and temporary routes, consisting of the following:

222.95	miles of Gravel
1,046.23	miles of Earth
.68	miles of Shale
10.67	miles of Cinders
19.22	miles of Macadam
1,299.75	miles total

The work performed on these detours is practically the same as on the surfaced roads, except that less attention is given to the roadside.

Numerous authorizations have been granted for the construction of additions and betterments, consisting of the erection of new safety signs and route markers, widening of curves, construction of guard fence, curbs and gutters, new culverts, spillways, baffle walls, and retaining walls. It is found necessary to construct these items in many cases where they were not contemplated or necessary under the original contract.

There was little reconstruction during 1925, but some may soon be required in the case of old State aid roads in the vicinity of Chicago.

There are many complaints concerning drainage problems, provision of entrance facilities and other conditions which require the personal attention of the Engineer of Maintenance. These cases are investigated carefully and adjustments made where deemed necessary. There are inquiries from cities, villages, townships, and counties for advice and information concerning maintenance methods.

3. PERMITS AND FRANCHISES.—The Road and Bridge Laws require that property owners, corporations, public utilities, and other organizations who wish to perform work of any nature within the limits of the right of way of roads under the jurisdiction of the Division of Highways, obtain a permit. During 1925, 1,673 permits for the construction of entrances to private properties, gasoline filling sta-

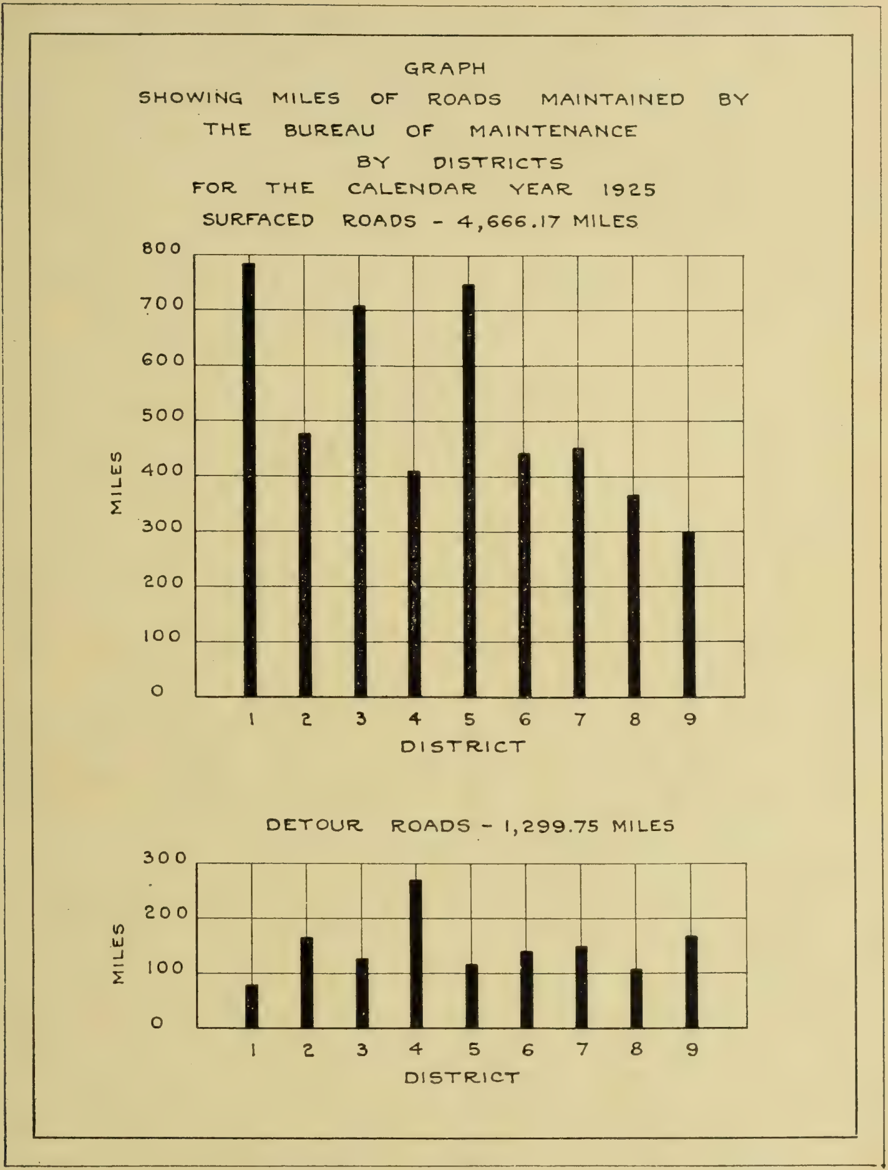


Figure 33.

tions, lunch stands, telephone and telegraph lines, electric power transmission lines, water mains, cable conduits, and sewers were issued.

The information necessary to determine the desirability of issuing permits for these purposes involves a considerable amount of work on the part of each district organization, since each case must be handled separately and decided on its own merits. It also involves the preparation of blue prints, specially drawn permits, and brings up points involving legal difficulties. The blue prints and legal aspects are examined in the district office, and then submitted to the Engineer of Maintenance. Through these permits, the Division of Highways is able to control the erection or establishment of such items within the right of way boundaries of the highways, and to prevent the encroachment of private interests or corporations on the domain of State property, thereby preserving the highways for highway purposes. No charge is made for permits.

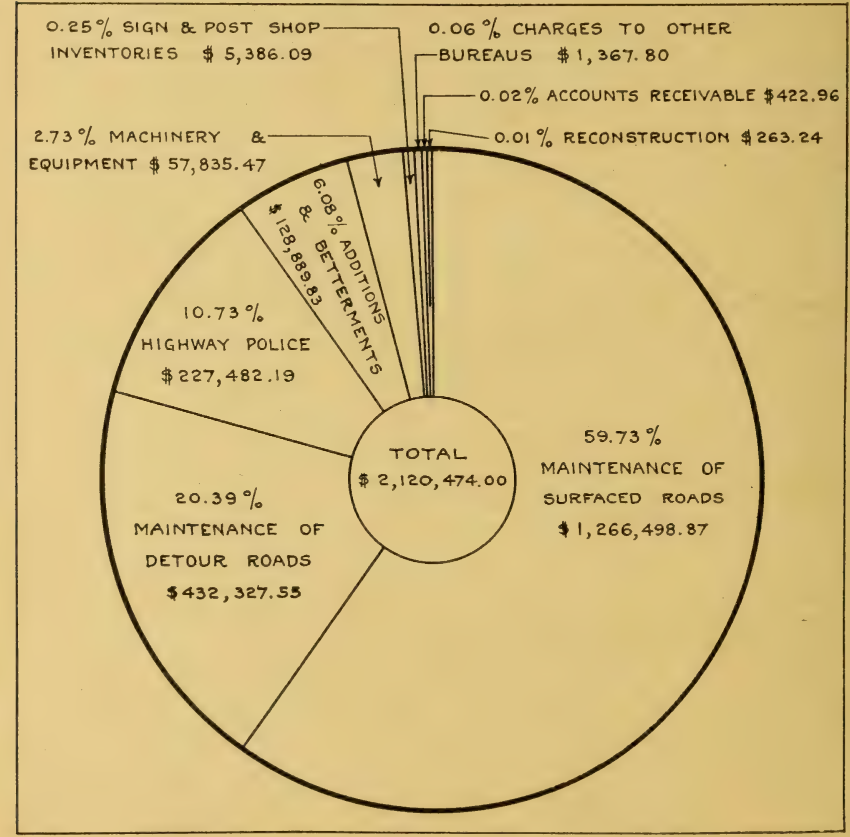


Figure 34.—Chart showing division of costs of the Bureau of Maintenance according to activities for the calendar year 1925.

4. COST ACCOUNTING.—The system of cost accounts, designed and installed on September 1, 1924, has been satisfactory. By a reclassification of accounts and a reorganization of the office force, it has been possible to handle the maintenance work on a very much increased mileage with a slight decrease in help. It is found that the new system expedites the payment of bills, the grouping and classify-

ing of costs according to classes of work and organization units, and makes it possible to determine the relative efficiency of each district in the kind of work in which they are engaged. It also enables each district office to control its organization and costs to a better advantage than was possible before the system was installed.

In July, it was decided to consolidate the accounting forces of the Division, consolidating them in the Bureau of Audits, and the forces engaged on this work in the Bureau of Maintenance were placed in the Bureau of Audits. At present practically all of the accounting work of the Division is placed within that Bureau.

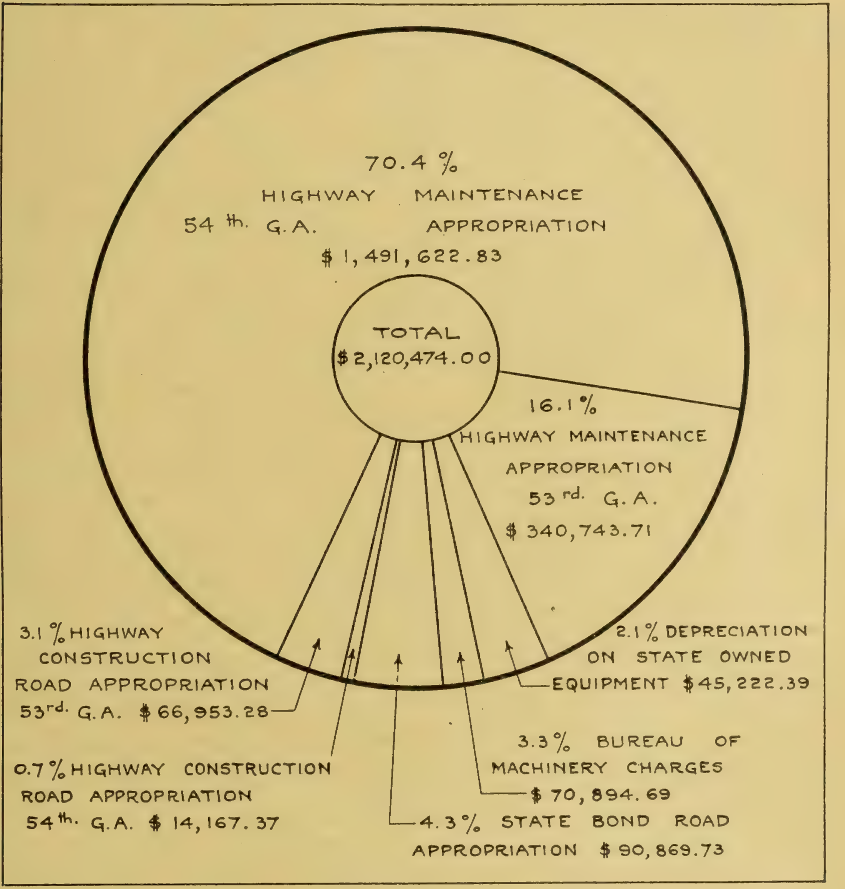


Figure 35.—Chart showing source of expenditures and total costs of the Bureau of Maintenance for the calendar year 1925.

Refinements in the accounting methods, necessary to handle the maintenance costs, have been added from time to time, with the result that the work is now being handled with less effort than was required before. By means of the cost accounts, the Engineer of Maintenance can obtain information which enables him to handle the organization of the districts, the assignment of equipment, and the handling of purchases and control of costs in a manner not possible heretofore.

TABLE XIII—POST CLOSING TRIAL BALANCE FOR CALENDAR YEAR 1925.

TITLE OF ACCOUNT.	
DEBITS—	
Surfaced Roads—	
District No. 1 Patrol Cost Control	$283,387.28
District No. 2 Patrol Cost Control	119,668.76
District No. 3 Patrol Cost Control	153,005.60
District No. 4 Patrol Cost Control	108,010.34
District No. 5 Patrol Cost Control	169,898.83
District No. 6 Patrol Cost Control	114,834.48
District No. 7 Patrol Cost Control	116,904.18
District No. 8 Patrol Cost Control	101,254.73
District No. 9 Patrol Cost Control	99,534.67
Detours—	
District No. 1 Patrol Cost Control	34,881.88
District No. 2 Patrol Cost Control	43,400.69
District No. 3 Patrol Cost Control	28,200.49
District No. 4 Patrol Cost Control	111,573.57
District No. 5 Patrol Cost Control	10,023.01
District No. 6 Patrol Cost Control	43,190.22
District No. 7 Patrol Cost Control	40,761.38
District No. 8 Patrol Cost Control	52,069.51
District No. 9 Patrol Cost Control	68,226.80
Additions and Betterments—	
District No. 1 Section Cost Control	12,214.72
District No. 2 Section Cost Control	7,381.14
District No. 3 Section Cost Control	13,542.57
District No. 4 Section Cost Control	15,359.00
District No. 5 Section Cost Control	13,088.39
District No. 6 Section Cost Control	45,884.55
District No. 7 Section Cost Control	6,363.00
District No. 8 Section Cost Control	6,472.06
District No. 9 Section Cost Control	8,584.40
Reconstruction—	
District No. 1 Section Cost Control	157.25
District No. 7 Section Cost Control	105.99
Police Officers' Cost Control	227,482.19
Police Officers' Equipment	15,971.83
Maintenance, Machinery and Equipment	41,863.64
Day Labor Construction	1,367.80
Accounts Receivable	422.96
Joliet Sign & Post Shop	2,388.86
Menard Sign & Post Shop	2,997.23
	$2,120,474.00
CREDITS—	
Allowance for Depreciation	$ 45,222.39
Bureau of Machinery—General Ledger	70,894.69
Highway Maintenance—53rd G. A.	340,743.71
Highway Maintenance—54th G. A.	1,491,622.83
Highway Construction Road Fund—53rd G. A.	66,953.28
Highway Construction Road Fund—54th G. A.	14,167.37
State Road Bond Fund—100 M	90,869.73
	$2,120,474.00

5. SNOW REMOVAL.—The increasing mileage of paved roads in the State demands a well designed snow removal program. The policy of keeping the main trunk highways of the State open to traffic at all seasons of the year has been inaugurated, and during the winter months the removal of snow in certain portions of the State involves a large amount of work and expense. Snow removal is a part of the work of each district organization, and to carry on this work, snow plows, tractors, and trucks equipped with straight or "V" shaped steel blades have been used successfully. This equipment is located at points where it will be readily accessible to the largest number of patrols requiring snow removal. During the winters of 1924 and 1925, snow was very light and no serious blockades occurred.

The following table shows the cost of removing snow for the Northern, Central and Southern districts, as well as the cost in each district located within these zones:

TABLE XIV—STATEMENT SHOWING COST OF SNOW REMOVAL FOR THE NORTHERN, CENTRAL AND SOUTHERN ZONES FOR THE CALENDAR YEAR 1925.

District.	Weighted average mileage.	Labor hours.	Direct labor.	Direct expense.	Direct total cost.	Overhead expense.	Total cost.	Average cost per mile.
No. 1	198.81	13,212	$6,494.01	$249.19	$6,743.20	$8,103.65	$14,846.85	$74.68
No. 2	202.81	5,896½	2,681.65	171.66	2,853.31	2,791.21	5,644.52	27.83
No. 3	273.51	5,468½	2,523.38	246.80	2,770.18	4,191.00	6,961.18	25.45
No. 4	138.82	6,988½	3,019.93	116.66	3,136.59	4,123.56	7,260.15	52.30
Total for Northern District	813.95	31,565½	$14,718.97	$784.31	$15,503.28	$19,209.42	$34,712.70	$42.65
No. 5	109.79	3,527	$1,704.56	----------	$1,704.56	$2,411.64	$4.116.20	$37.49
No. 6	144.86	3,466	1,630.57	----------	1,630.57	2,324.02	3,954.59	27.30
Total for Central District	254.65	6,993	$3,335.13	----------	$3,335.13	$4,735.66	$8.070.79	$31.69
No. 7	52.34	1,450½	$ 575.40	$94.93	$ 670.33	$ 530.03	$1,200.36	$22.93
No. 8	41.56	2,388	1,071.57	23.79	1,095.36	1,027.85	2,123.21	51.09
No. 9	45.16	1,044	484.98	18.51	503.49	493.77	997.26	22.08
Total for Southern District	139.06	4,882½	$2,131.95	$137.23	$2,269.18	$2,051.65	$4,320.83	$31.07
Total for entire State	1,207.66	43,441	$20,186.05	$921.54	$21,107.59	$25,996.73	$47,104.32	$39.00

6. MAINTENANCE OF SURFACED ROADS.—

a. Organization.—For the purpose of maintaining surfaced roads, each district has been divided into maintenance sections with a patrolman in charge of each section; the section, consisting of a number of patrols divided according to the type, width, and year of construction. The maintenance sections in each district average 19 miles in length, with an average patrol of 3.38 miles. A number of maintenance sections, usually about seven in number, are placed under the supervision of a supervising patrolman, who is responsible to the District Maintenance Engineer. The District Maintenance Engineer is in charge of all of the maintenance work in each district and is responsible to the District Engineer.

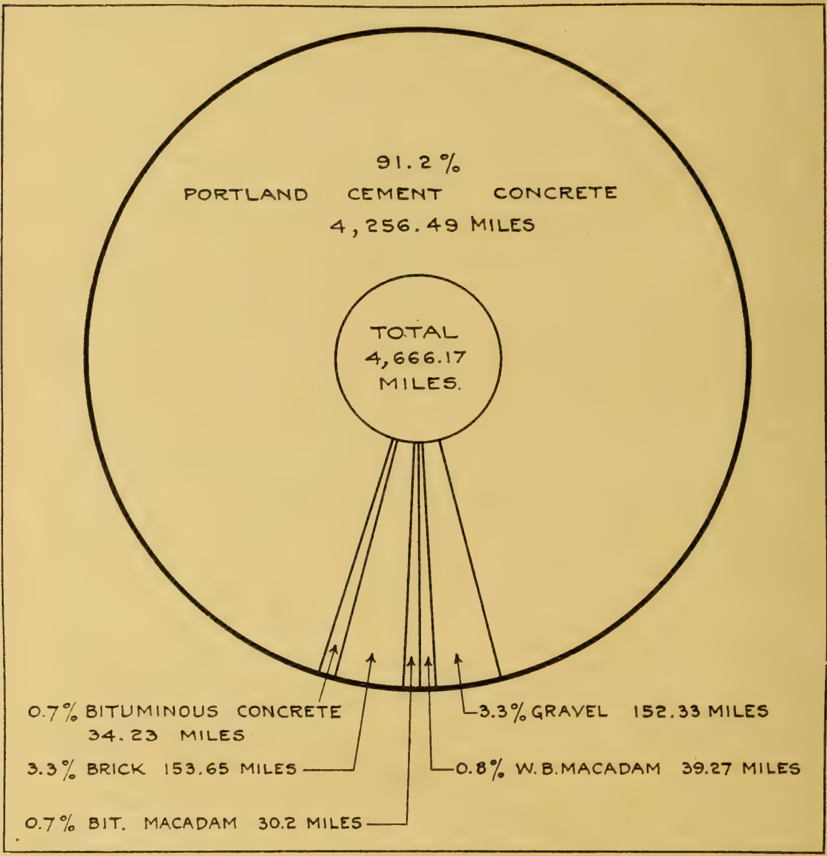


Figure 36.—Chart showing division of mileage of surfaced roads by types maintained during the calendar year 1925.

b. Equipment Used.—Each patrolman is equipped with a truck, tar kettle, grader and other small equipment necessary to maintain his patrol. Each patrolman is held directly responsible for the equipment furnished to him, is required to keep it in serviceable condition, and report its condition periodically to his supervising patrolman.

c. Methods Used in Maintenance.—Where minor cracks and breaks have developed in the pavement, they are generally repaired with asphalt, sand or gravel. Larger breaks are repaired with concrete, or with the same material as the original construction. Where depressions in the pavement are encountered adjacent to bridges, they are raised by an application of asphalt, stone, or chips, or are removed and replaced.

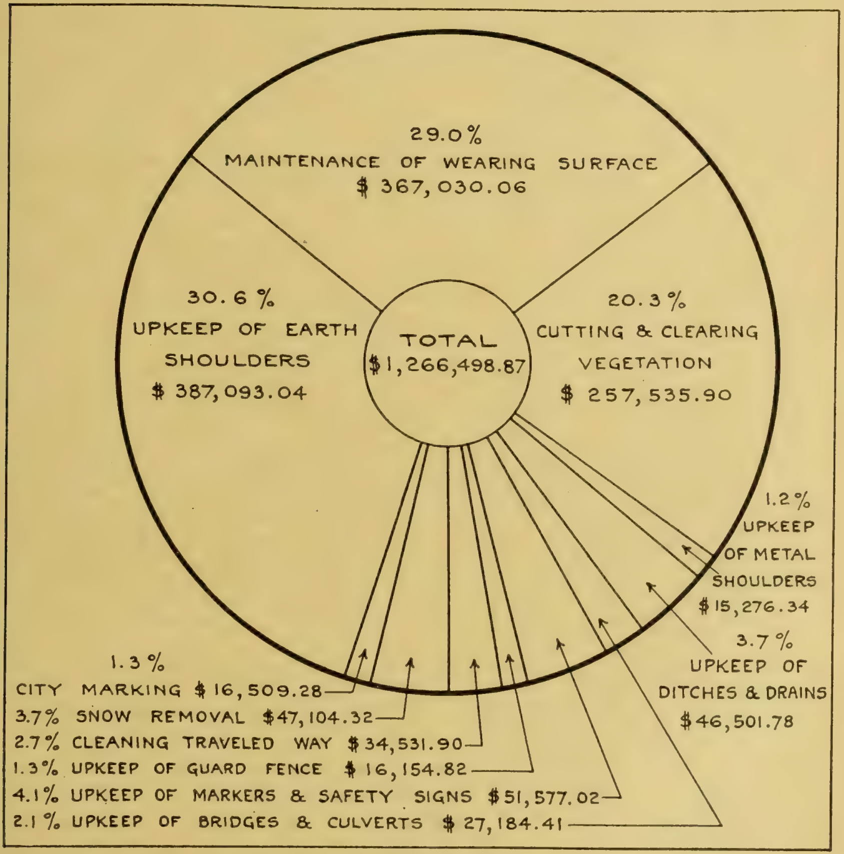


Figure 37.—Chart showing division of costs of the Bureau of Maintenance, by classification of work on surfaced roads, for the calendar year 1925.

Ruts in the shoulders are filled with earth and dragged smooth. On some of the heavier travelled roads, gravel or crushed stone is placed along the pavement where excessive ruts have developed. Ditchs and culverts are kept clean systematically in order to provide the necessary drainage. Weeds are cut and the shoulders mowed periodically. Objectionable growths, such as bushes and limbs of trees, are removed or cut back by the patrolmen, usually during the winter months.

d. Traffic Line Marking.—For the purpose of guiding traffic and protecting the center construction joint, an asphalt traffic line is applied in the center of the pavement. This line is painted with machines, developed and constructed by the Bureau of Maintenance. These machines have been so perfected that twenty miles of marking is easily accomplished each day with an ordinary crew at an average cost of $9.72 per mile, including labor and material.

e. Route Markers and Safety Signs.—All routes on the State bond issue system have been marked plainly with the route number, placed within an outline map of the State of Illinois. Telephone poles have also been marked and markers erected along the routes at frequent intervals as a guide to the traveling public. Routes through cities and villages have been marked with signs placed at convenient points indicating the direction and distance of prominent towns along the routes. The distance to towns lying a reasonable distance away from the route have also been indicated at the nearest and best road leading to such towns. At the junctions of all State routes, markers have been erected showing the route numbers and prominent towns along the route. Warning signs have also been erected, at necessary points, to warn the public of various degrees of potential danger. These signs have been erected a sufficient distance from the point of danger to enable the drivers to check the speed of their cars before reaching the indicated point. These signs indicate the degree of care necessary to be exercised by the driver; "Look" signs indicating a minimum degree; "Caution" signs an intermediate degree; and "Danger" signs a maximum degree.

Table XV shows the cost of maintenance and upkeep of 4,256.49 miles of concrete roads in all districts for the calendar year 1925.

Table XVI shows the cost of maintenance and upkeep of 34.23 miles of Bit. Concrete roads in all districts for the calendar year 1925.

Table XVII shows the cost of maintenance and upkeep of 153.65 miles of brick roads in all districts for the calendar year 1925.

Table XVIII shows the cost of maintenance and upkeep of 30.20 miles of Bit. Macadam roads in all districts for the calendar year 1925.

Table XIX shows the cost of maintenance and upkeep of 39.27 miles of W. B. Macadam roads in all districts for the calendar year 1925.

Table XX shows the cost of maintenance and upkeep of 152.33 miles of gravel roads in all districts for the calendar year 1925.

7. MAINTENANCE OF DETOURS, UNPAVED AND TEMPORARY ROUTES.—

a. Organization.—For the maintenance of detours, unpaved and temporary routes, the organization is similar to that used in the maintenance of surfaced roads. These roads are divided according to type into patrols, averaging 5.10 miles in length. Each patrol is placed under the charge of a patrolman who is responsible for the maintenance of the traveled way and upkeep of markers and safety signs. Only sufficient funds are expended on detours, unpaved and temporary routes to enable the traveling public to get through without any undue

TABLE XV—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 4,256.49 MILES OF CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1925.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	*Indirect cost.	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	216, 613¾	$101, 739.16	$95, 721.72	$3. 151.62	$200, 612.50	$106, 700.54	$307, 313.04	$72.20
Upkeep of Roadside—								
Metal shoulders	10, 556	$ 4, 713.38	$1, 455.15	$ .54	$ 6, 169.07	$ 5, 982.80	$ 12, 151.87	$ 2.86
Earth shoulders	394, 149¾	178, 094.27	6, 703.39	4, 494.45	189, 292.11	180, 591.85	369, 883.96	86.91
Ditches and drains	45, 495½	20. 595.91	379.84	442.27	21, 418.02	20, 694.30	42, 112.32	9.89
Bridges and culverts	24, 378½	11, 087.30	937.77	2, 457.56	14, 482.63	11, 709.31	26, 191.94	6.15
Markers and safety signs	49, 858¾	23, 717.25	966.77	610.93	25, 294.95	24, 525.96	49, 820.91	11.70
Guard fence	14, 954	6, 388.66	1, 597.28	127.84	8, 113.78	6, 751.44	14, 865.22	3.49
Cutting and clearing vegetation	246, 421	125, 059.95		2, 114.12	127, 174.07	113, 542.20	240, 716.27	56.55
Cleaning traveled way	32, 560	15, 024.57		348.43	15, 373.00	17, 720.24	33, 093.24	7.77
Snow removal	40, 533	18, 809.86		757.49	19, 567.35	24, 193.77	43, 761.12	10.28
Total upkeep	858, 906½	$403, 491.15	$12, 040.20	$11, 353.63	$426, 884.98	$405, 711.87	$832, 596.85	$195.60
Total maintenance and upkeep cost	1, 075, 520¼	$505, 230.31	$107, 761.92	$14, 505.25	$627, 497.48	$512, 412.41	$1, 139, 909.89	$267.80

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE XVI—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 34.23 MILES OF BIT. CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1925.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	*Indirect cost.	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	5,883	$2,992.59	$2,214.66	$287.35	$5,494.60	$2,937.61	$8,432.21	$246.34
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	1,790½	$ 942.26	$145.32	$47.75	$1,135.33	$ 900.71	$2,036.04	$59.48
Ditches and drains	389	198.26		35.41	233.67	241.52	475.19	13.88
Bridges and culverts	18	9.12			9.12	7.81	16.93	.49
Markers and safety signs	271½	134.22	19.50	24.87	178.59	135.91	314.50	9.19
Guard fence	105	51.30	14.72	7.45	73.47	54.23	127.70	3.73
Cutting and clearing vegetation	2,744½	1,555.51		59.33	1,614.84	1,262.75	2,877.59	84.07
Cleaning traveled way	126	61.39		10.70	72.09	64.98	137.07	4.00
Snow removal	472	238.03		13.59	251.62	293.01	544.63	15.92
Total upkeep	5,916½	$3,190.09	$179.54	$199.10	$3,568.73	$2,960.92	$6,529.65	$190.76
Total maintenance and upkeep costs	11,799½	$6,182.68	$2,394.20	$486.45	$9,063.33	$5,898.53	$14,961.86	$437.10

* Includes gas, oil, grease, repairs, and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XVII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 153.65 MILES OF BRICK ROADS IN ALL DISTRICTS FOR THE CLAENDAR YEAR 1925.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	*Indirect cost.	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	14,911½	$6,620.14	$4,941.77	$293.76	$11,855.67	$7,106.93	$18,962.60	$123.41
Upkeep of Roadside—								
Metal shoulders	2,156	$ 946.71	$716.30	$ 4.52	$1,667.53	$1,401.94	$ 3,069.47	$19.97
Earth shoulders	11,177½	5,057.73	218.49	73.21	5,349.43	5,487.57	10,837.00	70.52
Ditches and drains	2,320½	1,035.79	13.48	2.26	1,051.53	1,065.05	2,116.58	13.78
Bridges and culverts	638½	282.64	70.02	25.09	377.75	351.36	729.11	4.75
Markers and safety signs	1,178	559.10	5.86	1.72	566.68	558.91	1,125.59	7.33
Guard fence	908½	395.08	131.00	.71	526.79	462.22	989.01	6.44
Cutting and clearing vegetation	6,055½	2,976.06		27.75	3,003.81	2,892.00	5,895.81	38.37
Cleaning traveled way	977½	440.92		.74	441.66	584.87	1,026.53	6.68
Snow removal	1,838½	865.32		4.49	869.81	1,179.18	2,048.99	13.34
Total upkeep	27,250½	$12,559.35	$1,155.15	$140.49	$13,854.99	$13,983.10	$27,838.09	$181.18
Total maintenance and upkeep cost	42,162	$19,179.49	$6,096.92	$434.25	$25,710.66	$21,090.03	$46,800.69	$304.59

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XVIII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 30.20 MILES OF BIT. MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1925.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	*Indirect cost.	Total cost.	†Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	4,254½	$1,978.80	$2,137.94	$242.51	$4,359.25	$1,964.21	$6,323.46	$209.39
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	1,521	$721.15	$7.00	$10.33	$738.48	$731.74	$1,470.22	$48.68
Ditches and drains	102	48.14		1.20	49.34	56.70	106.04	3.51
Bridges and culverts	104	51.63		5.19	56.82	53.37	110.19	3.65
Markers and safety signs	154	75.14			75.14	96.18	171.32	5.67
Guard fence	72	31.68			31.68	24.61	56.29	1.86
Cutting and clearing vegetation	738	393.56		20.11	413.67	315.03	728.70	24.13
Cleaning traveled way	43	20.39			20.39	26.51	46.90	1.55
Snow removal	223	103.85			103.85	145.11	248.96	8.25
Total upkeep	2,957	$1,445.54	$7.00	$36.83	$1,489.37	$1,449.25	$2,938.62	$97.30
Total maintenance and upkeep costs	7,211½	$3,424.34	$2,144.94	$279.34	$5,848.62	$3,413.46	$9,262.08	$306.69

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* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

† Bituminous macadam roads are on the State Aid System. The average cost per mile is low because only sufficient money is expended on them to keep them passable. They are in short sections, widely separated and carry very light traffic.

TABLE XIX—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 39.27 MILES OF W. B. MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1925.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	*Indirect cost.	Total cost.	Average cost per mile.†
Maintenance of Wearing Surface—								
Paved surface	4,004	$2,061.91	$1,751.52	$154.73	$3,968.16	$1,795.81	$5,763.97	$146.78
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	859½	$428.79		$ 62.99	$491.78	$396.64	$ 888.42	$22.62
Ditches and drains	283½	140.49		20.32	160.81	146.67	307.48	7.83
Bridges and culverts	27	12.09			12.09	11.72	23.81	.61
Markers and safety signs	49	23.55			23.55	25.47	49.02	1.25
Guard fence	4½	2.02			2.02	2.88	4.90	.12
Cutting and clearing vegetation	1,157½	597.77		3.78	601.55	512.79	1,114.34	28.38
Cleaning traveled way	25	11.62			11.62	15.61	27.23	.69
Snow removal	136	61.27		126.74	188.01	72.73	260.74	6.4
Total upkeep	2,542	$1,277.60		$213.83	$1,491.43	$1,184.51	$2,675.94	$68.14
Total maintenance and upkeep cost	6,546	$3,339.51	$1,751.52	$368.56	$5,459.59	$2,980.32	$8,439.91	$214.92

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* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

† W. B. Macadam roads are on the State Aid System. The average cost per mile is low because only sufficient money is expended on them to keep them passable. They are in short sections, widely separated and carry very light traffic.

TABLE XX—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 152.33 MILES OF GRAVEL ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1925.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	*Indirect cost.	Total cost.	Average cost per mile.†
Maintenance of Wearing Surface—								
Paved surface	19,248	$9,498.49	$1,043.19	$874.90	$11,416.58	$8,818.20	$20,234.78	$132.84
Upkeep of Roadside—								
Metal shoulders	63	$ 22.05			$ 22.05	$ 32.95	$ 55.00	$ .36
Earth shoulders	1,916½	866.40		$ 78.01	944.41	1,032.99	1,977.40	12.98
Ditches and drains	1,393½	630.38		156.39	786.77	597.40	1,384.17	9.09
Bridges and culverts	121½	54.41		7.91	62.32	50.11	112.43	.74
Markers and safety signs	90	40.50		10.39	50.89	44.79	95.68	.63
Guard fence	103½	45.95		17.01	62.96	48.74	111.70	.73
Cutting and clearing vegetation	6,462	3,154.41		242.97	3,397.38	2,805.81	6,203.19	40.72
Cleaning traveled way	197	86.84		19.63	106.17	94.76	200.93	1.32
Snow removal	238½	107.72		19.23	126.95	112.93	239.88	1.57
Total upkeep	10,585½	$5,008.36		$551.54	$11,414.58	$4,820.48	$10,380.38	$68.14
Total maintenance and upkeep cost	29,833½	$14,506.85	$1,043.19	$1,426.44	$16,976.48	$13,638.68	$30,615.16	$200.98

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* Includes cost of gas, oil, grease, repairs and parts for trucks: depreciation of equipment and office overhead for both central and district offices.

† Gravel roads are on the State Aid System. The average cost per mile is low because only sufficient money is expended on them to keep them passable. They are in short sections, widely separated and carry very light traffic.

hardship. The patrolmen thus employed report to the supervisors, who are responsible to the District Maintenance Engineer. The patrolmen employed to do this work, are paid either on an hourly or monthly basis depending on the amount and kind of work needed on each patrol and the traffic conditions.

b. Equipment.—Each patrolman is required to furnish one or two teams. A light patrol grade and the necessary small tools required are furnished by the Department.

c. Methods.—Only such funds are expended for the maintenance of detours and temporary routes as are necessary to take care of traffic in a satisfactory manner. As soon as the construction work is completed, the pavement is thrown open to traffic and the detours or temporary routes abandoned.

d. Route Markers and Safety Signs.—Route markers and safety signs are erected along all detours, unpaved and temporary routes to guide traffic.

e. Maintenance of Gaps.—Gaps left in the pavement are surfaced with stone, gravel, cinders, shale, or other materials to make them passable.

8. CONSTRUCTION OF ADDITIONS AND BETTERMENTS.—After the original construction has been completed, it is sometimes found necessary to widen the pavement on curves and gutter sections, construct retaining walls, new culverts, baffle walls, new route markers, safety signs, or other additions and betterments. The payment of these items has been authorized from construction funds since they are equivalent to new construction. To control the construction of these items and the amount of funds involved, the district engineers are required to secure authorization for the work contemplated, showing the location and an estimate for its cost before they are permitted to do the work or expend the funds. The cost of these items is kept separate from the cost of maintenance of surfaced roads and detours. The following table shows the amount expended in each district for such purposes during the calendar year 1925:

TABLE XXI—STATEMENT SHOWING AMOUNTS EXPENDED FOR ADDITIONS AND BETTERMENTS DURING THE CALENDAR YEAR 1925.

District.	Total Cost.	District.	Total Cost.
No. 1	$12,214.72	No. 7	$ 6,363.00
No. 2	7,381.14	No. 8	6,472.06
No. 3	13,542.57	No. 9	8,584.40
No. 4	15,359.00		
No. 5	13,088.39	Total	$128.889.83
No. 6	45,884.55		

9. RECONSTRUCTION.—It has been found necessary in regions subject to heavy traffic, to reconstruct some of the early State aid roads due to the change in traffic conditions since the roads were completed. These pavements were not designed to carry the loads to which they are now subjected and have failed in some instances thus necessitating a small reconstruction program.

During 1925, very little reconstruction work was necessary, however. It is expected that the reconstruction of some of these sections will be necessary during 1926, since the maintenance involves a heavy expenditure of funds. It would, therefore, be more economical to reconstruct such sections than to maintain them under the present traffic conditions.

10. POLICING OF THE STATE HIGHWAY SYSTEM.—

a. Organization and Duties.—For the prevention of excessive maintenance costs caused by overloaded trucks and for the enforcement of the Motor Vehicle Act, a highway patrol organization has been effected, consisting of: 1 Chief, 12 Sergeants, 78 Officers, 4 Mechanics.

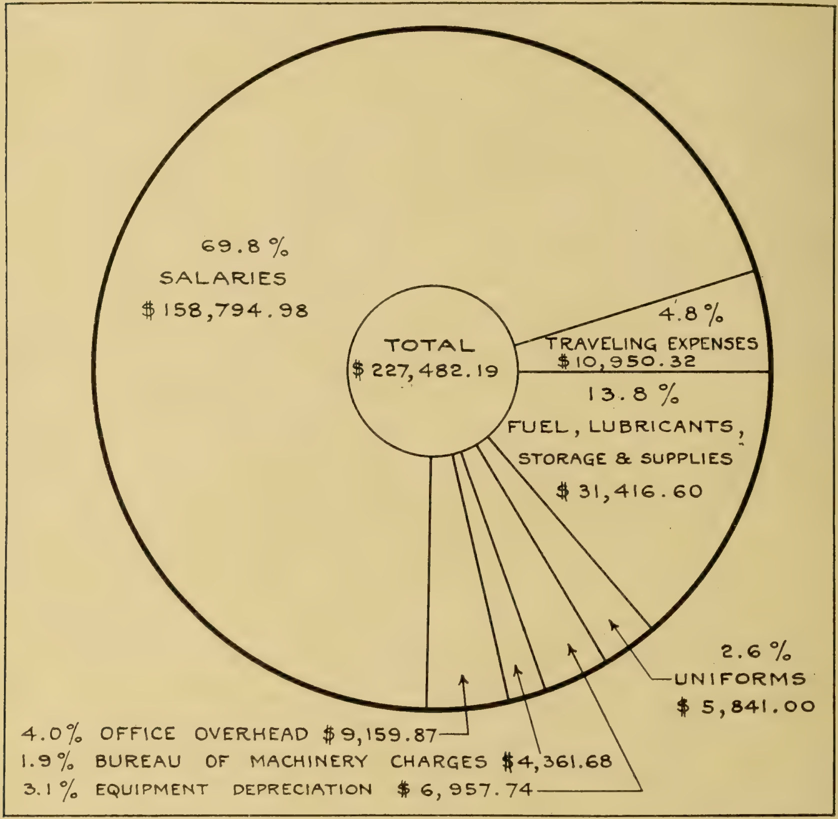


Figure 38.—Chart showing division of costs of Highway Patrol Officers for the calendar year 1925.

This organization is charged with the duty of weighing trucks, warning and arresting drunken or reckless drivers and recovering stolen cars.

b. Equipment.—Each highway patrol officer is furnished with a uniform, motorcycle and side car and a set of portable scales for weighing trucks.

c. Work Accomplished.—The following table shows the work accomplished by this force during the calendar year 1925:

TABLE XXII—SHOWING HIGHWAY PATROL WORK FOR 1925.

TRUCKS.

Weighed	7,510
Overweight	1,014
Arrests for overweight	590

SPEEDERS.

Warned	10,559
Arrests for speeding cars	769
Arrests for speeding trucks	258
Arrests for speeding busses	39

OTHER ARRESTS.

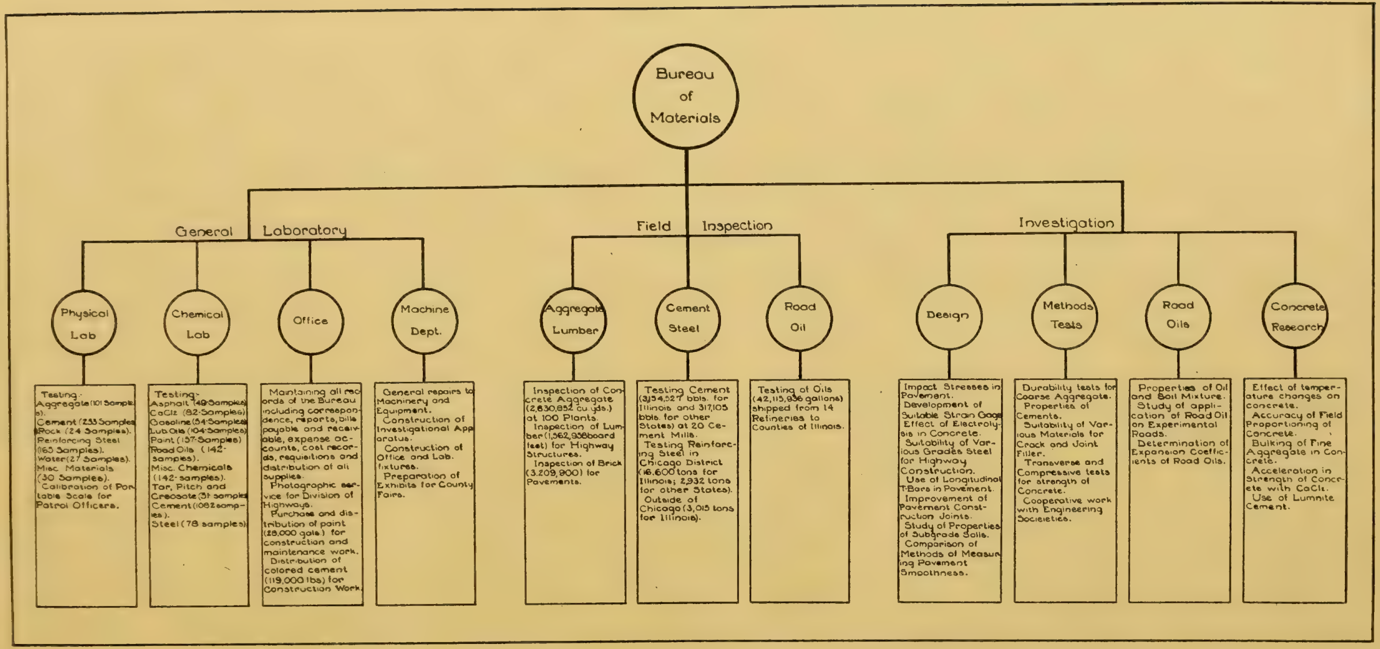
Assault	5
Bank robbers captured	2
Blocking traffic	26
Brakes (none)	5
Chauffeur's license	81
Concealed weapons	14
Defacing engine numbers	27
Defective tires	34
Disorderly conduct	76
Escaped convicts captured	9
Forgery	3
Fictitious plates	236
Grand larceny	61
Impersonating an officer	5
Intoxicated drivers	366
Injuring pavement	10
Lights (none and bright)	380
Leaving scene of accident	16
Leaving motor running	5
Murderers captured	2
Mirrors (none)	18
Overwidth	10
Plates (none)	304
Racing on highway	42
Reckless driving	376
Resisting arrest	18
Section No. 33	25
Speed control devices	17
Stealing cars	61
Stolen cars recovered	189
Transporting liquor	12
Miles covered by all officers	1,109,369

V. BUREAU OF MATERIALS.

1. GENERAL.—The work of the Bureau of Materials is divided mainly under two heads. First, inspection of materials entering into the construction work. Second, investigational work.

Careful and competent inspection is insisted upon. It is essential that the quality of the materials entering into the construction work be first-class in every respect and this Bureau is concerned with seeing that they meet the requirements of the specifications. Thorough study and great care may be given the preparation of plans and specifications, but poor workmanship and materials of inferior quality may completely destroy the painstaking efforts of the designer. This Bureau has been organized to the end that the greatest service may be given the contractor and producer with a minimum loss of time to the Department. The main items of work carried on in the general laboratory and in the field, together with the various investigations, are shown in Figure 39.

2. INSPECTION.—Inspection work, wherever possible, is performed at the source of supply or origin of shipment, to prevent delay resulting from inspection after delivery at the site of the work. The inspection work is under the direct supervision of the District Engineers of Materials who cooperate with the district engineers and the Construction Bureau. The responsibility of obtaining quality and type of material conforming to the specifications rests with the District Engineers of Materials.



Testing:- Aggregate (101 Samples). Cement (233 Samples) Rock (24 Samples). Reinforcing Steel (163 Samples). Water (27 Samples). Misc Materials (30 Samples). Calibration of Portable Scale for Patrol Officers.

Testing:- Asphalt (49 Samples) CaCl2 (82 Samples) Gasoline (54 Samples) Lub Oils (104 Samples) Paint (157 Samples) Road Oils (142 samples). Misc. Chemicals (142 samples). Tar, Pitch and Creosote (31 samples) Cement (1082 samples). Steel (78 samples)

Maintaining all records of the Bureau including correspondence, reports, bills payable and receivable, expense accounts, cost records, requisitions and distribution of all supplies. Photographic service for Division of Highways. Purchase and distribution of paint (28,000 gals.) for construction and maintenance work. Distribution of colored cement (119,000 lbs) for Construction Work.

General repairs to Machinery and Equipment. Construction of Investigational Apparatus. Construction of Office and Lab. fixtures. Preparation of Exhibits for County Fairs.

Inspection of Concrete Aggregate (2,630,852 cu. yds.) at 100 Plants. Inspection of Lumber (1,362,938 board feet) for Highway Structures. Inspection of Brick (3,209,900) for Pavements.

Testing Cement (3,154,527 bbls. for Illinois and 317,105 bbls. for other States) at 20 Cement Mills. Testing Reinforcing Steel in Chicago District (16,600 tons for Illinois; 2,932 tons for other States). Outside of Chicago (3,015 tons for Illinois).

Testing of Oils (42,115,936 gallons) shipped from 14 Refineries to Counties of Illinois.

Impact Stresses in Pavement. Development of Suitable Strain Gage. Effect of Electrolysis in Concrete. Suitability of Various Grades Steel for Highway Construction. Use of Longitudinal T-Bars in Pavement. Improvement of Pavement Construction Joints. Study of Properties of Subgrade Soils. Comparison of Methods of Measuring Pavement Smoothness.

Durability tests for Coarse Aggregate. Properties of Cements. Suitability of Various Materials for Crack and Joint Filler. Transverse and Compressive tests for strength of Concrete. Cooperative work with Engineering Socieieties.

Properties of Oil and Soil Mixture. Study of application of Road Oil on Experimental Roads. Determination of Expansion Coefficients of Road Oils.

Effect of temperature changes on concrete. Accuracy of Field Proportioning of Concrete. Bulking of Fine Aggregate in Concrete. Acceleration in Strength of Concrete with CaCl2. Use of Lumnite Cement.

Figure 39.—Chart showing the main items of work carried on by the Bureau of Materials.

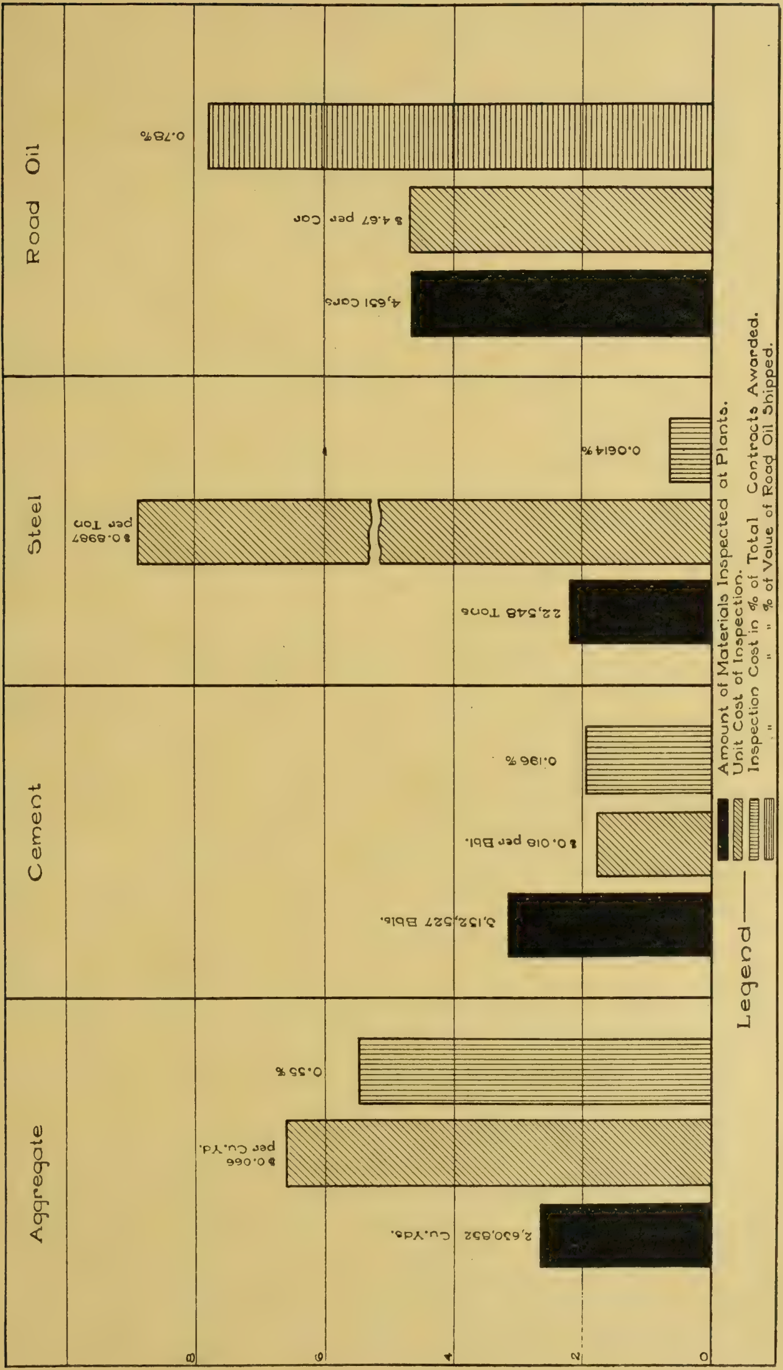


Figure 40.—Chart showing quantities of material and unit costs of inspection for 1925.

Inspection was made at 100 aggregate plants, 20 cement mills, 20 steel mills and warehouses, and 14 oil refineries. The extent of this inspection was such that the activities spread over 11 of the central states. The amount of material inspected at the various plants, the unit cost of inspection and the comparison of the inspection cost with the contract cost of the work awarded is shown in Figure 40.

In general, the facilities afforded our inspectors in 1925 were better than in previous years and the willingness of the material producers to cooperate is worthy of mention.

The service which has been afforded the various counties and townships in the past, in inspecting road oil, was continued throughout the year. Inspectors were sent to the refineries to take care of the inspection before shipment was made. It is believed that this service was valuable to the various counties and townships and that the results obtained justify its continuance, inasmuch as very few of these subdivisions have facilities for carrying on the inspection work.

3. INVESTIGATIONS.—The investigational work which has been carried on may be classified as follows:

a. Design Investigation.—Under design investigation the following work was carried on:

(1) Determination of stress set-up in pavement by impact loads.

(2) Development of a strain gauge suitable for measuring small impact stresses.

(3) The effect of electrolysis in concrete.

(4) Suitability of various grades of steel for highway construction.

(5) The use of a steel T-section in the edges of the pavement in place of the steel round section.

(6) Improvement of the strength of construction joints in pavement.

(7) Comparison of methods of measuring pavement smoothness.

(8) Study of properties of subgrade soils.

Interesting results were obtained in attempting to evaluate the stress set-up in pavement under impact loads by measuring the static load required to produce the deflection curve of the pavement slab which was produced by the impact load, and also measuring these stresses with the strain gauge. Due to the small amount of stress set-up and the exceedingly short duration of the same, approximately 1/25 of a second, measurements of this stress were difficult to obtain. An electrical strain gauge was devised, however, which gives promise of ability to obtain records of this stress accurately.

The investigation of the suitability of various grades of steel for highway construction, including both new billet and rail steel, has resulted in some valuable data. While the results of the investigation of the use of the T-section in the edges of the pavement are still incomplete, there are indications that greater rigidity at joints or breaks in the pavement may be obtained than that which is now being obtained by the use of the round bars. The investigation of the strength of joints has brought out the difficulty of securing satisfactory construction joints and has led to a revision of the standard practice in this detail.

Work with the profilometer has continued throughout the year, and the results obtained have indicated that the old method of measuring smoothness of surface with a straight edge was inefficient and that the use of an 8-wheel profilometer might be adopted, thereby giving more accurate results as well as obtaining a graphic record of the pavement surface.

Studies of subgrade soils have indicated the desirability of securing a uniform basis of classifying soils and the necessity of further study of these materials in order to secure improvement in the bearing power, particularly where poor sub-grade conditions exist.

The operation of core drills, which was formerly handled by the Bureau of Materials, was taken over by the Bureau of Construction early in 1925 to obtain information on thickness of pavement before final estimates are made.

b. Concrete Investigations.—The following work has been carried on in concrete investigations:

(1) The effect of change of temperature on concrete.

(2) The accuracy of field proportioning of concrete materials.

(3) The bulking of fine aggregates.

(4) The acceleration of strength of concrete with calcium chloride.

(5) The use of Lumnite cement.

The effect of change in temperature on concrete was observed by measuring the expansion and contraction of sections of pavement, and making determinations of the temperatures at various depths in concrete. Results indicate that compressive stresses may be set up under certain conditions in excess of the amount of tensile stress developed under ordinary wheel loads. Further, that the amount of stress and the temperature at which the compressive stress is set up depends largely upon the temperature at which the pavement was laid.

Investigation of field proportioning of concrete materials indicates that great variation may result from improper methods of handling the aggregates and variation in the moisture conditions, which will materially affect the resultant yield of concrete. The bulking of fine aggregates caused by change in moisture content affects this condition directly and frequently may be sufficient to reduce the yield and cause considerable change in the workability of the concrete.

Acceleration of the strength of concrete with the incorporation of calcium chloride was demonstrated on several occasions when it was necessary to open short sections of pavement to traffic within the minimum curing period. Test beams were made from the concrete actually used in construction in which calcium chloride had been incorporated. By determining the modulus of rupture of these beams, it was possible to recommend the opening of the pavement as soon as sufficient strength was developed, which resulted in the saving of considerable time to the traveling public. The use of Lumnite cement was handled in a similar manner in some instances.

c. Road Oil Investigation.—Considerable work was also done in the investigation of quality of road oils used by the various counties and townships of the State. This work has followed the line of observation of results achieved in application of various oils on sections of experimental roads and the examination of the properties of oil and soil mixtures. Laboratory determinations of the expansion coefficients of road oils were made for the purpose of correcting, on a uniform basis of volume, the quantity of oil shipped.

d. Methods of Tests Investigation.—Under methods of tests, investigations of those tests of aggregates dealing with the resistance of the material to disintegration by action of the weather have been of interest. Results of actual freezing and thawing tests, immersions of aggregate in solutions of sodium sulphate, and the abrasion of aggregates have indicated that the adoption of some combined form of abrasion and soundness tests may be suitable for the determination of resistance of aggregates to destruction and disintegration by the weather.

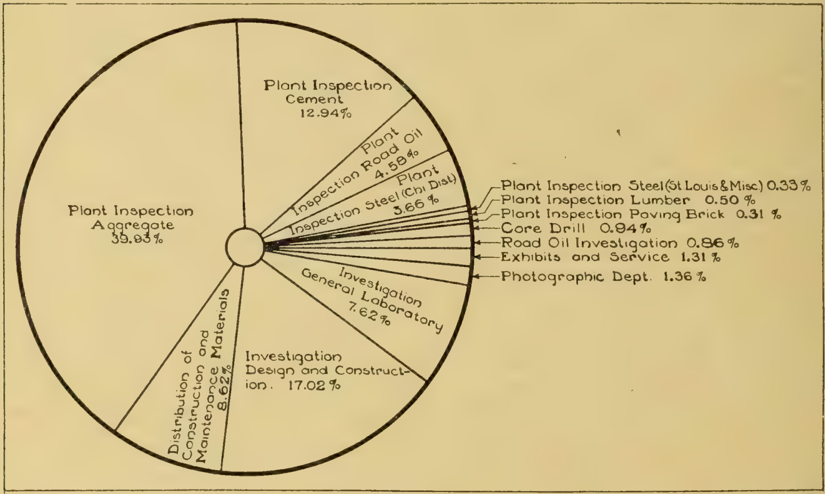


Figure 41.—Chart showing the relative proportion of the various activities of the Bureau of Materials by distribution of expense—1925.

Properties of cements have been investigated in connection with the variation in the quality of some brands used in construction and cements otherwise of satisfactory quality but which are occasionally slow in development of strength.

Materials were examined for use in maintaining cracks and joints in concrete pavement. These included asphalts of other consistency than that in present use, as well as white filler manufactured in the laboratory. The white filler appears to give satisfactory service and some sections of pavement are to be maintained with this material next year.

Comparison of transverse and compressive tests for strength of concrete indicates that transverse tests, in addition to being capable of satisfactory field use, give results with much greater uniformity than compressive tests and afford direct information on the modulus of rupture of concrete, on which our pavement design is based.

The laboratory also worked in cooperation with various technical societies, such as the American Society for Testing Materials, the American Concrete Institute, and the American Association of State Highway Officials, in formulating methods of tests and comparison of results from various laboratories on tests already adopted.

4. DEPARTMENTAL SERVICE.—The following departmental services are rendered by this bureau:

a. Photographic Service.—A photographic section has been maintained which has been of service to the entire Division of Highways and many valuable photographic records have been obtained.

b. Exhibits.—This Bureau has assisted in the preparation of exhibits for the various county fairs, for the purpose of keeping the public informed concerning the progress of highway development in this State. These consisted of illuminated progress maps and photographs of construction.

c. Construction and Maintenance Materials.—This Bureau distributes construction and maintenance materials in the form of colored cement for bridge handrails and paint for guard fence, signs, steel bridges, and longitudinal bars in pavement. Approximately 119,000 pounds of colored cement and 28,000 gallons of paint were distributed. The portable scales used by highway patrol officers for the detection of weight violations are calibrated and repaired by this Bureau.

Figure 41 shows the relative proportion of the various activities of the Bureau of Materials by distribution of expense.

VI. BUREAU OF MACHINERY.

1. MECHANICAL AND ELECTRICAL REPAIRS. — The Bureau of Machinery is the mechanical and electrical repair agent for the Division of Highways. Two repair shops are maintained in Springfield and at least nine other shops in various parts of the State. The major part of all the trucks and passenger cars, tractors, locomotives, cranes, steam pumps, etc., received from the U. S. Department of Agriculture have been reconditioned in these shops.

The mechanical force is handicapped in some repair work on account of the varied makes and models. Some of this equipment is of special design and if the repair part cannot be purchased, it is usually designed and made by the mechanic who has the work in hand. Nearly all of the commercial repair shows which serve the general public confine their repairs to one or two makes of passenger cars or trucks. This makes their repair work an easy problem.

The electrical work is confined principally to ignition, repairing of generators, motors, magnetos, and storage batteries. The major part of the equipment used in the ignition room was either salvaged from old supplies received from the U. S. Government or built by the mechanics in charge of this work. Nearly all the magneto and storage battery repairs for the Division of Highways are accomplished in this ignition room.

TABLE XXIII—STATEMENT SHOWING DISPOSITION OF TRUCKS RECEIVED FROM THE U. S. GOVERNMENT AS SURPLUS WAR MATERIAL AS OF DECEMBER 31, 1925.

Name of truck.	¾ ton.	1 ton.	1½ ton.	2 ton.	3 ton.	3½ ton.	5 ton.	6 ton.	Total.	Assigned to maintenance.	Assigned to construction.	Assigned to day labor.	Assigned to laboratory.	Assigned to counties.	Assigned to other depts. and insts.	Located in Springfield.	
																Unserviceable.	Serviceable.
Dart			1						1							1	
Diamond T						10			10					7			3
Dodge		10							10	4		1				3	2
F. W. D.					34				34					14		20	
Garford			57						57	10						4	43
Garford					1				1	1							
Garford								10	10							10	
G. M. C.			16						16	2			1	1		12	
Heavy Aviation					63				63	14			2	4		42	1
Hurlburt							2		2							2	
International				5					5						2	3	
Kelly-Springfield					12				12					8	1	3	
Light Aviation		20							20	4	1			2	1	12	
Liberty B					214				214	47	3	38	2	55	3	16	50
Mack			1						1							1	
Master				3					3							3	
Nash Quad				308					308	19				54	14	219	2
Packard					140				140	89		8		2	4	33	4
Packard				11					11	8	1					2	
Pierce Arrow							59		59	1			1	18	13	16	10
Pierce Arrow				30					30	6			1	4		19	
Republic	1								1							1	
Republic						2			2						1	1	
Reo	2								2	2							
Selden				10					10						2	8	
Service	1								1							1	
Standard						33			33	3				5	1	24	
Sterling				4					4					2		2	
Velie				1					1					1			
Velie					1				1						1		
White					1				1					1			
White			55						55	36		12	1			5	1
Total	4	30	130	372	466	45	61	10	1,118	246	5	59	8	178	43	463	116

NOTE.—Some of the unserviceable trucks that are shown as being located in Springfield will be repaired and placed in serviceable condition.

TABLE XXIV—STATEMENT SHOWING DISPOSITION OF PASSENGER CARS AS OF DECEMBER 31, 1925.

Make of car.	Total.	Assigned to maintenance.	Assigned to construction.	Assigned to day labor.	Assigned to laboratory.	Assigned to other departments.	Located in Springfield.	
							Serviceable.	Unserviceable.
Bicycles	429	8	46	11	92	1	180	91
Buick	2							2
Cadillac	7	2					5	
Dodge	46	8	22	2	3		6	5
Chalmers	1							1
Ford	134	24	65	2	2	4	1	36
G. M. C. Ambulance	44	18	12	1		1	3	9
Haynes	2							2
Hupmobile	1							1
Jordan	1						1	
Maxwell	1							1
Cleveland Motorcycle	27		2					25
Harley Davidson Motorcycle	114	27	26	3	3			55
Overland	8		4					4
Paige	1							1
Reo	10	1	9					
Sterns-Knight	1		1					
Velie	2							2
White	1							1
White Staff	10	1	3	1			1	4
White Ambulance	7		3	3				1
Chrysler	1	1						
Oakland	32	8	23	1				
Total	882	98	216	24	100	6	197	241

TABLE XXV—STATEMENT SHOWING DISPOSITION OF MISCELLANEOUS EQUIPMENT RECEIVED FROM THE U. S. GOVERNMENT AS SURPLUS WAR MATERIAL AS OF DECEMBER 31, 1925.

Kind of equipment.	Total.	Assigned to maintenance.	Assigned to construction.	Assigned to day labor.	Assigned to laboratory.	Assigned to counties.	Assigned to other State depts. and institutions.	Assigned to contractors.	Located in Springfield.
Orange peel and clam shell—buckets	30			5			2		23
Concrete mixers	20	4		3	1				12
Stiff leg derricks and locomotive cranes	35			7	1		1	2	24
Dump wagons	15			12					3
Electric motors and generators	115	10		12	18		1		73
Hoisting and swinging engines	31			4				2	25
Holt tractors (20 ton)	5								5
Holt tractors (5 ton)	13	7		2					4
Holt tractors (10 ton)	81	18		13		2		1	47
International tractors	3	1							2
Locomotives	25			10					15
Flat and gondola cars	178		2	52			12		112
Graders	9			5					4
Road rollers	4	1		1		1			1
Steam engines	5						1		4
Steam shovel	1	1							
Trailers	23	14		3			1		5

THE DEPARTMENT HAS ALSO RECEIVED A QUANTITY OF THE FOLLOWING MISCELLANEOUS EQUIPMENT, A PORTION OF WHICH IS IN STORAGE AT THE STATE FAIR GROUNDS, BUT THE LARGER PORTION HAS BEEN ASSIGNED TO THE BUREAUS OF MAINTENANCE, CONSTRUCTION AND TESTS.

Areoplane hangers.
Tents.
Asphalt plant.
Carpenter tools.
Controllers.
Duck and tarpaulin.
Field ranges.
Field kitchens.
Gas engines.
Grinding machines.
Lumber.
Portable forges.
Power conveyor.
Tractor plows.
Rail.
Road plows.
Rope.
Steam boilers.
Rock drills.
Picks.
Spades, etc.
Sprinkling wagons.
Stone crushers.
Tamping machine.
Water pipe.
Water pumps.
Water tanks.
Anvils.
Belting.
Cans.
Chain.
Drills.
Drill presses.
Hose.
Files.
Engineer's supplies.
Lanterns.
Laboratory supplies.
Mechanic's tools.
Lathes.
Nails.
Post hole diggers.
Pliers.
Callipers.
Sledges.
Stocks.
Dies.
Wrenches.
Vices.
Wheelbarrows, etc.

2. REPAIR PARTS AND STORAGE ROOMS.—In the repair parts room, it is necessary to carry repairs for at least twelve makes and models of trucks and four makes of touring cars. A large stock of repairs must be carried at all times, since the majority of the repairs requested by the nine district garages are supplied from this stock. Tires and inner tubes alone, purchased by the Division of Highways during 1925, reached an approximate total of $67,000. The Day Labor organizations and requests from counties and State institutions are also supplied from this stock room.

Immense supplies of surplus war materials have been received from the U. S. Department of Agriculture and are being used or distributed to the various bureaus of the Division of Highways.

3. RENTAL OF SURPLUS WAR MATERIAL.—In order to expediate the building of the public highways, certain kinds of machinery and supplies were rented to contractors who had State or federal aid road contracts.

Early in 1920, this Division set aside a certain number of trucks for rental to the various counties and townships. A schedule was prepared and a certain quota was made available for each of the 102 counties. The records show that eighty counties received some part or all of their quota. One hundred and seventy-eight trucks are now under lease at a nominal rate per year.

4. DISPOSITION OF TRUCKS AND PASSENGER CARS.—Tables XXIII and XXIV show the distribution of trucks and passenger cars to the various bureaus of the Department of Public Works and Buildings, as well as other State departments.

5. TRAVELING INSPECTORS.—Soon after the counties and townships began to rent trucks for their use, it was found expedient to send out traveling mechanical inspectors. Their principal duties were to examine the trucks under lease and make reports concerning their mechanical condition. These reports are examined, and if neglect or misuse is apparent, a request is made to the county or township to make repairs or correct violations of their contract. In most cases under observation, there is a spirit of cooperation and willingness to comply with the requests. A large number of the trucks leased are old and of inferior make and workmanship. No doubt the personal contact of the inspectors with the lessees of the truck, has made it possible to keep this class of equipment in better mechanical condition and in longer use than if conditions had been otherwise.

VII. BUREAU OF AUDITS.

1. ACCOUNTING AND AUDITING.—Recommendations made in 1924 for consolidating the accounting work of the Division were followed during 1925 and practically the entire accounting force of the Division is now located in the Bureau of Audits. Furthermore, the accounts and cost records of the Division have been further perfected. The Maintenance and Machinery accounts are now on a double entry basis.

Recommendations have also been made for the establishment of a statistical section for the compilation and dissemination of statistical data. In order to handle the statistical work efficiently, recommendations have been made for the installation of tabulating equipment which should be of great assistance in the tabulation and distribution of this data since it is possible to obtain greater speed, accuracy, and greater volume by this means than is possible by manual methods.

During 1925 this Bureau inaugurated a system of cost accounts in the maintenance section of its work whereby costs are now obtained by organization units and by various classes of work which the Bureau of Maintenance performs. All of the accounts for this class of work are under the double entry system and control accounts are carried in the general books, for each district and each class of work, whereby a full accounting of all expenditures in any district, for any class of work, is possible.

Numerous improvements have been made during 1925 in the methods of handling the accounting work of this Bureau and studies of possible means of elimination and consolidation have been made. It has not been necessary to employ addition help and a greater volume of work has been handled in a more systematic and efficient manner.

The total expenditure of the Division during 1925 amounted to $33,388,679.25 covered by 54,728 vouchers.

During 1926 we expected to carry on the work of placing all the accounts of this Division under the double entry system and of creating classifications of accounts whereby a greater variety of information may be secured with less work than is now required.

The following statement represents the collections of the Division of Highways for the calendar year 1925:

TABLE XXVI—STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS AND SOURCES FROM WHICH COLLECTED FROM JANUARY 1, 1925 TO DECEMBER 31, 1925.

Month.	Engineering, inspection and tests.	Construction refunds.	Maintenance refunds.	Equipment, rentals and sales.	Total.
January	$2,047.35	$ 5,105.70	$ 415.46	$12,760.87	$20,329.38
February	1,208.33	14,942.13	954.84	4,212.56	21,317.86
March	1,601.26	1,643.42	3,597.80		6,842.48
April	6,719.87	120.56	426.70	18,114.56	25,381.69
May	3,555.43	12.76	397.34	6,847.69	10,813.22
June	1,722.92	6,560.59	92.39		8,375.90
July	2,273.49	12,256.26	206.29	7,469.83	22,205.87
August	564.00		8.70	12,049.01	12,621.71
September	4,745.48	11,760.35	328.80	2,304.92	19,139.55
October	2,509.96	18,043.50	254.66	3,305.04	24,113.16
November	1,742.03	8,885.33	170.87	1,870.39	12,668.62
December	3,867.35	8,946.38	652.60	1,817.02	15,283.35
Total	$32,557.47	$88,276.98	$7,506.45	$70,751.89	$199,092.79

2. REPORTS AND FINANCIAL ESTIMATES.—In the following pages will be found financial and statistical statements relating to the work of the Division of Highways.

The following statement represents the revenue, which the Division has drawn on, which has accrued to the credit of the Road Fund for the years 1911 to 1925 inclusive:

TABLE XXVII—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Total.
1911	$ 74,552.59			$ 74.552.59
1912	364,708.03			364,708.03
1913	499,802.45			499,802.45
1914	700,233.00			700.233.00
1915	903,284.09			903,284.09
1916	1,238,483.92			1,238,483.92
1917	1,629,445.26			1,629,445.26
1918	2.770,084.60		$ 85.00	2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50	3.765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68	11.111,995.56
Sub-total	$17,273,087.13	$5,724,799.05	$60,390.18	$23,058,276.36
1921	$ 6,862,125.83	$3,802,430.46	$221,645.55	$10,886,201.84
1922	7,904,219.71	1.733,334.86	132,495.77	9,770,050.34
1923	9,677,318.64	4,257,276.06	127,847.10	14,062,441.80
1924	11,557,838.94	3,565,058.69	300,045.58	15,422,943.21
1925	13,050,977.39	2,717,923.43	514,260.69	16,283,161.51
Sub-total	$49,052,480.51	$16,076,023.50	$1,296,294.69	$66,424.798.70
Grand total	$66,325,567.64	$21,800,822.55	$1,356,684.87	$89,483,075.06

The following represents the appropriations made by the General Assembly from the Road Fund since 1913:

TABLE XXVIII—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For maintenance.	For State highways.	For county refunds.	For cement plant.	For Fay Hunsley relief.	For gravel plant.	Principal and interest on highway bonds.	Refunds to municipalities.	Construction through municipalities.	Totals.
1913	$ 400,000.00											$ 400,000.00
1914	700,000.00											700,000.00
1915	1,000,000.00											1,000,000.00
1916	1,000,000.00											1,000,000.00
1917	1,200,000.00	$ 1,326,000.00										2,526,000.00
1918												
1919	500,000.00	26,600,000.00						$125,000.00				27,225,000.00
1920												
1921			$3,000,000.00	$20,000,000.00	$3,889,382.23	$5,000,000.00	$4,000.00		$1,000,000.00			32,893,382.23
1922												
1923			3,000,000.00	20,000,000.00	4,025,632.56	5,000,000.00			4,000,000.00			36,025,632.56
1924												
1925			6,000,000.00	35,000,000.00	2,704,818.95	5,000,000.00			12,320,000.00	$300,000.00	$1 000 000.00	62,324,818.95
Total	$4,800,000.00	$27,926,000.00	$12,000,000.00	$75,000,000.00	$10,619,833.74	$15,000,000.00	$4,000.00	$125,000.00	$17,320,000.00	$300,000.00	$1,000,000.00	$164,094,833.74

The following statement represents the expenditures from the Road Fund shown under the proper appropriations covering the years 1914 to 1925 inclusive:

TABLE XXIX—TOTAL ANNUAL EXPENDITURES FROM ROAD FUND SHOWN UNDER PROPER APPROPRIATION.

Year.	State aid.	Federal aid.	State highway.	Maintenance.	Refunds to counties.	Fay Hunsley relief.	Interest and principal on highway bonds.	Construction through municipalities.	Total.
1914	$ 364,202.39								$ 364,202.39
1915	662,516.23								662,516.23
1916	681,248.36								681,248.36
1917	1,141,567.05								1,141,567.05
1918	393,424.40	$ 190,578.78							584,003.18
1919	623,117.27	4,352,870.62							4,975,987.89
1920	472,568.30	11,108,931.33							11,581,499.63
1921	248,088.68	7,407,287.97	$ 4,526,651.22	$ 225,737.08	$ 719,273.18	$4,000.00			13,131,038.13
1922	32,784.91		6,837,603.37	640,486.78	1,798,184.50		$ 757,460.00		10,066,519.56
1923	25,975.27		9,234,214.69	1,110,209.41	1,411,337.49				11,781,736.86
1924			12,522,782.01	2,044,860.69	1,176,893.14		1,388,813.35		17,133,349.19
1925			9,269,469.84	1,834,637.74	602,050.80		2,687,303.72	$19,592.59	14,413,054.69
Total	$4,645,492.86	$23,059,668.70	$42,390,721.13	$5,855,931.70	$5,707,739.11	$4,000.00	$4,833,577.07	$19,592.59	$86,516,723.16

The following statements represents the purpose of the expenditures made from the Road Fund during the years 1914 to 1925 inclusive:

TABLE XXX—EXPENDITURES FROM THE ROAD FUND 1914 TO 1925.

Year.	State aid construction.	Federal aid and S. B. I. construction.	Maintenance.	Refunds to counties.	Fay Hunsley relief.	Interest and principal on 60m bonds.	Construction through municipalities.	Total.
1914	$ 364,202.39							$ 364,202.39
1915	652,644.73		$ 9,871.50					662,516.23
1916	660,561.93		20,686.43					681,248.36
1917	1,106,034.79		35,532.26					1,141,567.05
1918	356,120.42	$ 190,578.78	37,303.98					584,003.18
1919	538,502.90	4,352,870.62	84,614.37					4,975,987.89
1920	263,765.75	11,108,931.33	208,802.55					11,581,499.63
Sub-total	$3,941,832.91	$15,652,380.73	$396,811.09					$19,991,024.73
1921	$115,167.91	$11,933.939.19	$ 358,657.85	$ 719,273.18	$4,000.00			$13,131,038.13
1922	32,768.68	6,837,603.37	640,503.01	1,798,184.50		$ 757,460.00		10,066,519.56
1923	25,975.27	9,234,214.69	1,110,209.41	1,411,337.49				11.781,736.86
1924		12,522,782.01	2,044,860.69	1,176,893.14		1,388,813.35		17,133,349.19
1925		9,269,469.84	1,834,637.74	602,050.80		2,687,303.72	19,592.59	14.413,054.69
Sub-total	$173,911.86	$49,798,009.10	$5,988,868.70	$5,707,739.11	$4,000.00	$4,833,577.07	$19,592.59	$66,525,698.43
Total	$4,115,744.77	$65,450,389.83	$6,385,679.79	$5,707,739.11	$4,000.00	$4,833,577.07	$19,592.59	$86,516,723.16

The following statement represents the collection of motor license fees by the Secretary of State, and shows the number of vehicles from which the collections were made during the calendar years 1911 to 1925 inclusive:

TABLE XXXI—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Year of collection.	Number of vehicles.	Fees collected.
1911	38,269	$ 105,344.28
1912	68,012	375,716.22
1913	94,646	507,134.77
1914	131,140	703,403.70
1915	180,832	924,905.74
1916	248,429	1,242,509.65
1917	340,252	1,587,772.69
1918	389,761	2,762,567.53
1919	478,438	3,262,176.57
1920	568,759	5,893,586.02
1921	670,452	6,663,910.22
1922	785,378	7,861,211.21
1923	969,092	9,630,367.77
1924	1,132,641	11,513,957.05
1925	1,267,734	12,936,882.13
Total 1911 to 1925		$65,971,445.55

NOTE.—This statement represents the collections of motor fees, by calendar years, by the Secretary of State's office and can not be compared with the revenue deposited with the State Treasurer, due to the fact that the law requires the Secretary of State to deposit his collections each thirty days following the date of receipt.

The following statement represents the collection of motor license fees by months during the calendar years 1922, 1923, 1924 and 1925:

TABLE XXXII—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

	1922	1923	1924	1925
January	$3,252,174.66	$4,014,285.44	$5,542,566.42	$5,952,896.84
February	1,471,791.61	1,740,113.23	1,800,877.12	2,355,086.26
March	966,026.65	1,143,169.52	1,203,696.55	1,480,242.01
April	589,703.34	814,812.00	1,109,041.92	1,241,706.96
May	586,177.70	660,851.24	672,716.70	599,550.75
June	322,684.94	381,256.39	335,451.15	370,950.36
July	271,588.96	349,875.26	351,320.94	378,403.54
August	170,736.44	213,537.77	192,873.25	219,491.73
September	115,170.49	131,154.87	137,691.72	159,867.43
October	80,244.66	109,111.62	106,516.39	108,431.17
November	44,282.04	53,007.85	47,113.75	50,544.89
December	11,900.53	19,192.58	14,091.14	19,710.19
Total	$7,882,482.02	$9,630,367.77	$11,513,957.05	$12,936,882.13
Refunds	21,270.81			
Total	$7,861,211.21	$9,630,367.77	$11,513,957.05	$12,936,882.13

The following statement represents the collection of motor license fees by counties during the calendar years 1921, 1922, 1923 and 1924:

TABLE XXXIII—SCHEDULE OF MOTOR FEES BY COUNTIES AS COLLECTED BY SECRETARY OF STATE.

	1921	1922	1923	1924
Cook	$2,013,788.25	$2,335,925.75	$3,230,180.00	$4,146,998.00
Adams	78,597.00	91,174.25	114,990.00	131,363.00
Alexander	14,902.00	17,286.75	21,980.00	28,418.00
Bond	17,307.75	20,077.50	26,995.00	31,215.00
Boone	28,550.50	33,119.25	33,982.00	37,595.00
Brown	14,055.00	16,304.00	16,450.00	17,100.00
Bureau	78,549.75	91,124.75	92,866.00	104,925.00
Calhoun	8,613.81	9,991.50	9,824.00	12,110.00
Carroll	39,976.25	46.373.50	46,841.00	49,942.00
Cass	30,488.75	35,367.50	38,884.00	40,101.00
Champaign	120,484.25	139,764.50	139,863.00	163,098.00
Christian	60,733.50	70,452.00	69,520.00	80,393.00
Clark	28,476.00	33,036.50	39,452.00	44,928.00
Clay	14,014.35	16,257.00	18,898.00	23,818.00
Clinton	21,724.50	25,127.00	31,880.00	35,991.00
Coles	50,798.75	58,928.00	66,590.00	77,512.00
Crawford	43,994.85	51,034.00	52,337.00	56,980.00
Cumberland	13,756.75	15,958.25	16,270.00	21,001.00
DeKalb	69,836.50	81,127.75	81,480.00	90,185.00
DeWitt	35,842.50	41,578.50	40,442.00	44,044.00
Douglas	41,568.75	48,220.75	45,338.00	46,860.00
DuPage	49,280.75	57,166.75	103,110.00	131,091.00
Edgar	48,020.25	55,704.75	54.965.00	60,358.00
Edwards	10,226.25	11,838.00	14,496.00	17,611.00
Effingham	17,077.50	19,810.25	28,730.00	36,984.00
Fayette	21,394.25	24,817.75	26,792.00	32,130.00
Ford	40,091.50	46,507.00	41,961.00	44,050.00
Franklin	35,097.00	40,713.25	85,715.00	105,513.00
Fulton	77,302.75	89,673.00	96,990.00	109,841.00
Gallatin	8,308.25	9,637.75	10,729.00	12,480.00
Greene	26,165.25	30,352.00	32.874.00	37,900.00
Grundy	31,877.75	36.978.75	37,441.00	43,222.00
Hamilton	5,651.75	6,556.50	10,722.00	13,481.00
Hancock	57,236.75	66,395.75	68,388.00	74,585.00
Hardin	2,311.00	2,680.75	3,760.00	5,635.00
Henderson	16,724.50	19,400.50	18,977.00	19,759.00
Henry	94,373.50	109,440.25	110,333.00	118,853.00
Iroquois	84,533.50	98.057.75	86,950.00	92,250.00
Jackson	25,277.50	29,317.75	49,461.00	63,500.00
Jasper	13,560.50	15,703.25	19,615.00	23,867.00
Jefferson	16,812.50	19,503.75	35,570.00	46,914.00
Jersey	12,564.25	14,572.75	16,711.00	19,001.00
JoDaviess	37,922.75	43.990.50	43,855.00	48,196.00
Johnson	5,319.75	6,169.50	9,444.00	12,020.00
Kane	130,819.25	151,751.75	199,250.00	237,250.00
Kankakee	72,911.25	84,577.50	86,966.00	102,070.00
Kendall	23,610.25	27,387.50	24,008.00	26,760.00
Knox	71,983.40	83,500.75	104,340.00	117,583.00
Lake	77,709.35	90,144.50	126,931.00	164,874.00
LaSalle	142,976.50	165,852.00	174,960.00	203,732.00
Lawrence	35,512.40	41,184.75	41,900.00	47,438.00
Lee	61,276.00	71,080.00	72,440.00	81,695.00
Livingston	88,796.10	103,153.50	94,585.00	96,643.00
Logan	58,070.00	67,362.75	64,210.00	65,268.00
Macon	93,173.85	108,078.50	125,455.00	152,421.00
Macoupin	55,982.75	64,940.50	88,980.00	101,125.00
Madison	99,232.15	115,110.50	172,910.00	219,872.00
Marion	28,428.50	32,976.75	60,221.00	69,952.00
Marshall	30,820.75	35,751.75	31,410.00	31,389.00
Mason	34,446.50	39,958.52	40,112.00	43.784.00
Massac	9,053.75	10,500.50	12,920.00	16,587.00
McDonough	52,215.00	60,568.75	61,133.00	68,457.00
McHenry	65,985.50	76,540.22	81,911.00	94,563.00
McLean	140,441.75	162,913.75	160,871.00	176,324.00
Menard	20,221.30	23,456.75	24,955.00	26,839.00
Mercer	45,960.00	53,313.75	50,127.00	51,215.00
Monroe	14,962.50	17,356.50	22,260.00	25,777.00
Montgomery	51,421.60	59,649.75	71,008.00	81,897.00
Morgan	43,317.00	50,246.75	57,004.00	63,690.00
Moultrie	24,829.75	28,802.50	26,980.00	27,829.00
Ogle	62,936.00	73,006.00	73,120.00	80,357.00
Peoria	153.328.50	178,061.25	235,866.00	271.726.00
Perry	16,345.50	18,960.25	33,783.00	40,952.00
Piatt	40,904.50	47,449.25	41,200.00	41,620.00
Pike	25,392.50	29,454.57	41,944.00	47,325.00

TABLE XXXIII—Concluded.

	1921	1922	1923	1924
Pope	$ 4,025.50	$ 4,668.50	$ 4,895.00	$ 5,766.00
Pulaski	8,043.75	9,330.25	13,700.00	17,252.00
Putnam	9,582.50	11,115.75	12,622.00	13,785.00
Randolph	23,373.00	27,113.25	43,117.00	51,632.00
Richland	17,192.50	19,943.75	21,933.00	27,501.00
Rock Island	119,603.50	138,742.50	156,847.00	189,946.00
Saline	25,040.00	29,043.25	52,670.00	63,669.00
Sangamon	137,482.00	159,487.25	174,911.00	206,024.00
Schuyler	17,160.50	19,903.50	23,574.00	26,913.00
Scott	14,258.00	16,539.00	16,788.00	19,769.00
Shelby	42,517.50	49,320.25	49,311.00	53,446.00
Stark	25,392.50	20,455.00	28,448.00	29,299.00
St. Clair	114,818.75	133,191.50	209,376.00	255,653.00
Stephenson	63,830.50	74,043.75	89,550.00	98,632.00
Tazewell	62,054.00	71,984.00	70,121.00	80,154.00
Union	12,331.75	14,306.50	19,005.00	28,182.00
Vermilion	115,205.25	133,640.00	158,980.00	185,204.00
Wabash	14,718.75	17,073.54	20,441.00	24,423.00
Warren	44,539.75	51,434.75	50,622.00	64,445.00
Washington	19,977.75	23,174.00	27,791.00	32,677.00
Wayne	14,231.25	16,507.50	20,282.00	26,328.00
White	19,394.75	22,496.75	23,612.00	26,513.00
Whiteside	78,427.50	90,977.81	95,887.00	108,669.00
Will	107,350.50	124,527.25	165,282.00	199,882.00
Williamson	43,011.50	49,894.00	97,599.00	116,409.00
Winnebago	135,406.75	157,073.75	175,678.00	209,671.00
Woodford	51,557.51	59,844.55	51,914.77	53,530.25
Total	$6,776,781.17	$7,861,211.21	$9,630,367.77	$11,546,206.25
Less refunds*				32,249.20
Total	$6,776,781.17	$7,861,211.21	$9,630,367.77	$11,513,957.05

NOTE.—The figures for 1925 have not been compiled by the Secretary of State's office and will be included in the next annual report.

The following statement represents the allotment of Federal Aid funds by the United States Government to Illinois during the years 1917 to 1926 inclusive:

TABLE XXXIV—STATEMENT OF FEDERAL AID FUNDS ALLOTTED BY THE U. S. GOVERNMENT TO ILLINOIS 1917 TO 1926 INCLUSIVE.

Year.	Amount.	Year.	Amount.
1917	$ 220,926.23	1923	$2,164,187.38
1918	441,852.46	1923, reapportioned	28,611.00
1919	2,185,550.65	1924	2,797,888.59
1919	658,323.48	1925	3,203,867.99
1920	874,220.26	1926	3,191,479.00
1920	3,278,325.97		
1921	1,091,266.98	Total	$26,656,581.99
1921	3,273,800.93		
1922	3,246,281.07		

The following statement represents the revenue derived from the sale of the $60,000,000.00 Bond Issue and shows the weighted average sale rate together with the weighted average yield on all series sold:

TABLE XXXV—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $60,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	94.020	4.83	$5,000,000.00	$4,709,477.78	$4,709,477.78	
1922	Apr. 13	98.875	4.19	6,000,000.00	5,940,111.11	5,940,111.11	
1922	Sept. 18	99.688	4.04	6,000,000.00	6,083,855.65	6,083,855.65	
1923	Feb. 20	98.183	4.15	6,000,000.00	5,908,333.34	5,908,333.34	
1923	May 25	97.000	4.40	7,000,000.00	6,837,667.68	6,837,667.68	
1923	Oct. 16	94.41	4.68	6,000,000.00	5,687,266.68	5,687,266.68	
1923	Dec. 22	94.46	4.50	6,000,000.00	5,678,266.67	5,667,600.00	$10,666.67
1924	June 3	96.525	4.29	9,000,000.00	8,704,200.00	8,704,200.00	
1924	Aug. 15	99.109	4.08	9,000,000.00	8,947,800.00	8,919,800.00	28,000.00
Total		97.4949	4.32	$60,000,000.00	$58,496,978.91	$58,458,312.24	$38,666.67

NOTE.—The figure of 4.32 shown under Interest Yield represents the weighted average yield of all series sold.

The figure of 97.4949 shown in the sale rate column represents the average sale rate on all series sold.

The following statement represents the appropriations made by the General Assembly of the $60,000,000.00 Bond Issue Fund:

TABLE XXXVI—APPROPRIATIONS PAYABLE FROM $60,000,000.00 BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922			
1923	30,000,000.00		30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

The following statement represents the annual expenditures which have been made from the $60,000,000.00 Bond Issue Fund during the calendar years 1921, 1922, 1923 and 1924:

TABLE XXXVII—EXPENDITURES FROM $60,000,000.00 BOND ISSUE FUND 1921 TO 1924.

Year.	Construction.	Refunds to counties.	Total.
1921	$ 2,461,000.65	$ 8,000.00	$ 2,469,000.65
1922	12,420,711.49	637,820.93	13,058,532.42
1923	18,607,057.40	605,182.71	19,212,240.11
1924	23,718,539.06		23,718,539.06
Total	$57,207,308.60	$1,251,003.64	$58,458,312.24

NOTE.—This covers the entire expenditures from the Bond Fund.

The following statement shows the amount of principal and the amount of interest due each year on the $60,000,000.00 Bond Issue together with $24,000,000.00 sold of the $100,000,000.00 Bond Issue to December 31, 1925:

TABLE XXXVIII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF THE $60,000,000.00 AND $100,000,000.00 BOND ISSUES DECEMBER 31, 1925.

Year in which principal is to be retired and interest paid.	Principal of $60,000,000.00 to be retired each year.	Principal of $100,000,000.00 to be retired each year.	Total principal both issues to be retired each year.	Interest on $60,000,000.00 to be paid each year.	Interest on $100,000,000.00 to be paid each year.	Total interest both issues payable each year.	Total principal and interest payable each year.
1922				$ 100,000.00		$ 100,000.00	$ 100,000.00
1923				680,000.00		680,000.00	680,000.00
1924				1,380,000.00		1,380,000.00	1,380,000.00
1925				2,160,000.00	$533,333.33	2,693,333.33	2,693,333.33
1926	$2,000,000.00		$2,000,000.00	2,400,000.00	960,000.00	3,360,000.00	5,360,000.00
1927	2,000,000.00		2,000,000.00	2,320,000.00	960,000.00	3,280,000.00	5,280,000.00
1928	2,000,000.00		2,000,000.00	2,240,000.00	960,000.00	3,200,000.00	5,200,000.00
1929	2,000,000.00		2,000,000.00	2,160,000.00	960,000.00	3,120,000.00	5,120,000.00
1930	2,000,000.00		2,000,000.00	2,080,000.00	960,000.00	3,040,000.00	5,040,000.00
1931	2,000,000.00		2,000,000.00	2,000,000.00	960,000.00	2,960,000.00	4,960,000.00
1932	2,000,000.00	$500,000.00	2,500,000.00	1,920,000.00	950,000.00	2,870,000.00	5,370,000.00
1933	2,000,000.00	500,000.00	2,500,000.00	1,840,000.00	930,000.00	2,770,000.00	5,270,000.00
1934	2,000,000.00	500,000.00	2,500,000.00	1,760,000.00	910,000.00	2,670,000.00	5,170,000.00
1935	3,000,000.00	500,000.00	3,500,000.00	1,680,000.00	890,000.00	2,570,000.00	6,070,000.00
1936	3,000,000.00	500,000.00	3,500,000.00	1,560,000.00	870,000.00	2,430,000.00	5,930,000.00
1937	3,000,000.00	500,000.00	3,500,000.00	1,440,000.00	850,000.00	2,290,000.00	5,790,000.00
1938	4,000,000.00	500,000.00	4,500,000.00	1,320,000.00	830,000.00	2,150,000.00	6,650,000.00
1939	4,000,000.00	500,000.00	4,500,000.00	1,160,000.00	810,000.00	1,970,000.00	6,470,000.00
1940	5,000,000.00		5,000,000.00	1,000,000.00	800,000.00	1,800,000.00	6,800,000.00
1941	5,000,000.00		5,000,000.00	800,000.00	800,000.00	1,600,000.00	6,600,000.00
1942	5,000,000.00		5,000,000.00	600,000.00	800,000.00	1,400,000.00	6,400,000.00
1943	5,000,000.00		5,000,000.00	400,000.00	800,000.00	1,200,000.00	6,200,000.00
1944	5,000,000.00		5,000,000.00	200,000.00	800,000.00	1,000,000.00	6,000,000.00
1945		2,000,000.00	2,000,000.00		760,000.00	760,000.00	2,760,000.00
1946		2,000,000.00	2,000,000.00		680,000.00	680,000.00	2,680,000.00
1947		2,000,000.00	2,000,000.00		600,000.00	600,000.00	2,600,000.00
1948		2,000,000.00	2,000,000.00		520,000.00	520,000.00	2,520,000.00
1949		2,000,000.00	2,000,000.00		440,000.00	440,000.00	2,440,000.00
1950		2,000,000.00	2,000,000.00		360,000.00	360,000.00	2,360,000.00
1951		2,000,000.00	2,000,000.00		280,000.00	280,000.00	2,280,000.00
1952		2,000,000.00	2,000,000.00		200,000.00	200,000.00	2,200,000.00
1953		2,000,000.00	2,000,000.00		120,000.00	120,000.00	2,120,000.00
1954		2,000,000.00	2,000,000.00		40,000.00	40,000.00	2,040,000.00
Total	$60,000,000.00	$24,000,000.00	$84,000,000.00	$33,200,000.00	$21,333,333.33	$54,533,333.33	$138,533,333.33

The following statement represents the arrangement of the retirement of Highway Bonds and the payment of interest showing the amount due at each retirement and interest paying period on the entire $60,000,000.00 Bond Issue plus $24,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1925:

TABLE XXXIX—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT DUE AT EACH RETIREMENT AND INTEREST PAYING PERIOD ON THE ENTIRE $60,000,000.00 BOND ISSUE PLUS $24,000,000.00 OF THE $100,000,000.00 BOND ISSUE SOLD TO DECEMBER 31, 1925.

Year in which principal is to be retired and interest paid.	Principal to be retired Mar. 1 each year.	Principal to be retired May 1 each year.	Total principal to be retired during year.	Interest to be paid Mar. 1 each year.	Interest to be paid May 1 each year.	Interest to be paid Sept. 1 each year.	Interest to be paid Nov. 1 each year.	Total interest payable each year.	Total payable all series each year.
1925				$ 960,000.00	$1,253,333.33	$400,000.00	$80,000.00	$2,693,333.33	$2,693,333.33
1926		$2,000,000.00	$2,000,000.00	1,600,000.00	1,280,000.00	400,000.00	80,000.00	3,360,000.00	5,360,000.00
1927		2,000,000.00	2,000,000.00	1,600,000.00	1,200,000.00	400,000.00	80,000.00	3,280,000.00	5,280,000.00
1928		2,000,000.00	2,000,000.00	1,600,000.00	1,120,000.00	400,000.00	80,000.00	3,200,000.00	5,200,000.00
1929		2,000,000.00	2,000,000.00	1,600,000.00	1,040,000.00	400,000.00	80,000.00	3,120,000.00	5,120,000.00
1930		2,000,000.00	2,000,000.00	1,600,000.00	960,000.00	400,000.00	80,000.00	3,040,000.00	5,040,000.00
1931		2,000,000.00	2,000,000.00	1,600,000.00	880,000.00	400,000.00	80,000.00	2,960,000.00	4,960,000.00
1932		2,500,000.00	2,500,000.00	1,600,000.00	800,000.00	400,000.00	70,000.00	2,870,000.00	5,370,000.00
1933		2,500,000.00	2,500,000.00	1,600,000.00	710,000.00	400,000.00	60,000.00	2,770,000.00	5,270,000.00
1934		2,500,000.00	2,500,000.00	1,600,000.00	620,000.00	400,000.00	50,000.00	2,670,000.00	5,170,000.00
1935	$1,000,000.00	2,500,000.00	3,500,000.00	1,600,000.00	530,000.00	400,000.00	40,000.00	2,570,000.00	6,070,000.00
1936	1,000,000.00	2,500,000.00	3,500,000.00	1,560,000.00	440,000.00	400,000.00	30,000.00	2,430,000.00	5,930,000.00
1937	1,000,000.00	2,500,000.00	3,500,000.00	1,520,000.00	350,000.00	400,000.00	20,000.00	2,290,000.00	5,790,000.00
1938	3,000,000.00	1,500,000.00	4,500,000.00	1,480,000.00	260,000.00	400,000.00	10,000.00	2,150,000.00	6,650,000.00
1939	3,000,000.00	1,500,000.00	4,500,000.00	1,360,000.00	210,000.00	400,000.00		1,970,000.00	6,470,000.00
1940	4,000,000.00	1,000,000.00	5,000,000.00	1,240,000.00	160,000.00	400,000.00		1,800,000.00	6,800,000.00
1941	4,000,000.00	1,000,000.00	5,000,000.00	1,080,000.00	120,000.00	400,000.00		1,600,000.00	6,600,000.00
1942	4,000,000.00	1,000,000.00	5,000,000.00	920,000.00	80,000.00	400,000.00		1,400,000.00	6,400,000.00
1943	4,000,000.00	1,000,000.00	5,000,000.00	760,000.00	40,000.00	400,000.00		1,200,000.00	6,200,000.00
1944	5,000,000.00		5,000,000.00	600,000.00		400,000.00		1,000,000.00	6,000,000.00
1945	2,000,000.00		2,000,000.00	400,000.00		360,000.00		760,000.00	2,760,000.00
1946	2,000,000.00		2,000,000.00	360,000.00		320,000.00		680,000.00	2,680,000.00
1947	2,000,000.00		2,000,000.00	320,000.00		280,000.00		600,000.00	2,600,000.00
1948	2,000,000.00		2,000,000.00	280,000.00		240,000.00		520,000.00	2,520,000.00
1949	2,000,000.00		2,000,000.00	240,000.00		200,000.00		440,000.00	2,440,000.00
1950	2,000,000.00		2,000,000.00	200,000.00		160,000.00		360,000.00	2,360,000.00
1951	2,000,000.00		2,000,000.00	160,000.00		120,000.00		280,000.00	2,280,000.00
1952	2,000,000.00		2,000,000.00	120,000.00		80,000.00		200,000.00	2,200,000.00
1953	2,000,000.00		2,000,000.00	80,000.00		40,000.00		120,000.00	2,120,000.00
1954	2,000,000.00		2,000,000.00	40,000.00				40,000.00	2,040,000.00
Total	$50,000,000.00	$34,000,000.00	$84,000,000.00	$29,680,000.00	$12,053,333.33	$9,800,000.00	$840,000.00	$52,373,333.33	$136,373,333.33

The following statements represents the arrangement of the retirement of the principal and interest on the $60,000,000.00 Bond Issue which was voted November 4, 1918:

TABLE XL—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $60,000,000.00—4% BONDS.

Total bond voted November 4, 1918	$60,000,000.00
Total bonds authorized for sale	60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each yar.
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		2,160,000.00	2,160,000.00	4,320,000.00
1926	$2,000,000.00	2,400,000.00	4,400,000.00	8,720,000.00
1927	2,000,000.00	2,320,000.00	4,320,000.00	13,040,000.00
1928	2,000,000.00	2,240,000.00	2,420,000.00	17,280,000.00
1929	2,000,000.00	2,160,000.00	4,160,000.00	21,440,000.00
1930	2,000,000.00	2,080,000.00	4,080,000.00	25,520,000.00
1931	2,000,000.00	2,000,000.00	4,000,000.00	29,520,000.00
1932	2,000,000.00	1,920,000.00	3,920,000.00	33,440,000.00
1933	2,000,000.00	1,840,000.00	3,840,000.00	37,280,000.00
1934	2,000,000.00	1,760,000.00	3,760,000.00	41,040,000.00
1935	3,000,000.00	1,680,000.00	4,680,000.00	45,720,000.00
1936	3,000,000.00	1,560,000.00	4,560,000.00	50,280,000.00
1937	3,000,000.00	1,440,000.00	4,440,000.00	54,720,000.00
1938	4,000,000.00	1,320,000.00	5,320,000.00	60,040,000.00
1939	4,000,000.00	1,160,000.00	5,160,000.00	65,200,000.00
1940	5,000,000.00	1,000,000.00	6,000,000.00	71,200,000.00
1941	5,000,000.00	800,000.00	5,800,000.00	77,000,000.00
1942	5,000,000.00	600,000.00	5,600,000.00	82,600,000.00
1943	5,000,000.00	400,000.00	5,400,000.00	88,000,000.00
1944	5,000,000.00	200,000.00	5,200,000.00	93,200,000.00
Total	$60,000,000.00	$33,200,000.00	$93,200,000.00	$93,200,000.00

TABLE XLI—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sa[illegible]. 25, 1921. Date of issue—Nov. 1, 1921. Rate $94.020. Yield 4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$ 100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE XLII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 2—$6,000,000.00—4% BONDS.

Date of sale—April 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240, 000.00	$240, 000.00	$ 240, 000.00
1924		240, 000.00	240, 000.00	480, 000.00
1925		240, 000.00	240, 000.00	720, 000.00
1926		240, 000.00	240, 000.00	960, 000.00
1927		240, 000.00	240, 000.00	1, 200, 000.00
1928		240, 000.00	240, 000.00	1, 440, 000.00
1929	$500, 000.00	240, 000.00	740, 000.00	2, 180, 000.00
1930	500, 000.00	220, 000.00	720, 000.00	2, 900, 000.00
1931	500, 000.00	200, 000.00	700, 000.00	3, 600, 000.00
1932	500, 000.00	180, 000.00	680, 000.00	4, 280, 000.00
1933	500, 000.00	160, 000.00	660, 000.00	4, 940, 000.00
1934	500, 000.00	140, 000.00	640, 000.00	5, 580, 000.00
1935	500, 000.00	120, 000.00	620, 000.00	6, 200, 000.00
1936	500, 000.00	100, 000.00	600, 000.00	6, 800, 000.00
1937	500, 000.00	80, 000.00	580, 000.00	7, 380, 000.00
1938	500, 000.00	60, 000.00	560, 000.00	7, 940, 000.00
1939	500, 000.00	40, 000.00	540, 000.00	8, 480, 000.00
1940	500, 000.00	20, 000.00	520, 000.00	9, 000, 000.00
Total	$6, 000, 000.00	$3, 000, 000.00	$9, 000, 000.00	$9, 000, 000.00

TABLE XLIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue May 1, 1922. Rate, $99.688. Yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240, 000.00	$240, 000.00	$ 240, 000.00
1924		240, 000.00	240. 000.00	480, 000.00
1925		240, 000.00	240, 000.00	720, 000.00
1926		240, 000.00	240, 000.00	960, 000.00
1927		240, 000.00	240. 000.00	1, 200, 000.00
1928		240, 000.00	240, 000.00	1, 440, 000.00
1929	$500, 000.00	240, 000.00	740, 000.00	2, 180, 000.00
1930	500, 000.00	220, 000.00	720, 000.00	2, 900, 000.00
1931	500, 000.00	200, 000.00	700, 000.00	3, 600, 000.00
1932	500, 000.00	180, 000.00	680, 000.00	4, 280, 000.00
1933	500, 000.00	160, 000.00	660, 000.00	4, 940, 000.00
1934	500, 000.00	140, 000.00	640, 000.00	5, 580, 000.00
1935	500, 000.00	120, 000.00	620, 000.00	6, 200, 000.00
1936	500, 000.00	100, 000.00	600, 000.00	6, 800, 000.00
1937	500, 000.00	80, 000.00	580, 000.00	7, 380, 000.00
1938	500, 000.00	60, 000.00	560, 000.00	7, 940, 000.00
1939	500, 000.00	40, 000.00	540, 000.00	8, 480, 000.00
1940	500, 000.00	20, 000.00	520, 000.00	9, 000, 000.00
Total	$6, 000, 000.00	$3, 000, 000.00	$9, 000, 000.00	$9, 000, 000.00

TABLE XLIV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—Mar. 1, 1923. Rate $98.183. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$240,000.00	$ 240,000.00	$ 240,000.00
1925		240. 000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1933		240,000.00	240,000.00	2,400,000.00
1934		240,000.00	240,000.00	2,640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120. 000.00
1937		240,000.00	240. 000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000. 000.00	160,000.00	1,160,000.00	6,960,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1. 000,000.00	80,000.00	1,080. 000.00	9,160,000.00
1943	1,000,000.00	40. 000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE XLV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Yield 4.40.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$ 280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	$ 500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220 000.00	720,000.00	3,560. 000.00
1930	500,000.00	200,000.00	700,000.00	4,260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600,000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1. 000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40. 000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE XLVI—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16, 1923. Date of issue—Oct. 1, 1923. Rate $94.41. Yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580,000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE XLVII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable to Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1929		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

TABLE XLVIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 8—$9,000,000.00—4% BONDS.

Date of sale—June 3, 1924. Date of issue—June 1, 1924. Rate $96.525. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$270,000.00	$ 270,000.00	$ 270,000.00
1926		360,000.00	360,000.00	630,000.00
1927		360,000.00	360,000.00	990,000.00
1928		360,000.00	360,000.00	1,360,000.00
1929		360,000.00	360,000.00	1,710,000.00
1930		360,000.00	360,000.00	2,070,000.00
1931		360,000.00	360,000.00	2,430,000.00
1932		360,000.00	360,000.00	2,790,000.00
1933		360,000.00	360,000.00	3,150,000.00
1934		360,000.00	360,000.00	3,510,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,370,000.00
1936	500,000.00	340,000.00	840,000.00	5,210,000.00
1937		320,000.00	320,000.00	5,530,000.00
1938		320,000.00	320,000.00	5,850,000.00
1939		320,000.00	320,000.00	6,170,000.00
1940	1,000,000.00	320,000.00	1,320,000.00	7,490,000.00
1941	1,000,000.00	280,000.00	1,280,000.00	8,770,000.00
1942	2,000,000.00	240,000.00	2,240,000.00	11,010,000.00
1943	2,000,000.00	160,000.00	2,160,000.00	13,170,000.00
1944	2,000,000.00	80,000.00	2,080,000.00	15,250,000.00
Total	$9,000,000.00	$6,250,000.00	$15,250,000.00	$15,250,000.00

TABLE XLIX—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—Aug. 15, 1924. Date of issue—Aug. 1, 1924. Rate $99.109. Yield 4.08.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$210,000.00	$ 210,000.00	$ 210,000.00
1926		360,000.00	360,000.00	570,000.00
1927		360,000.00	360,000.00	930,000.00
1928		360,000.00	360,000.00	1,290,000.00
1929		360,000.00	360,000.00	1,650,000.00
1930		360,000.00	360,000.00	2,010,000.00
1931		360,000.00	360,000.00	2,370,000.00
1932		360,000.00	360,000.00	2,730,000.00
1933		360,000.00	360,000.00	3,090,000.00
1934		360,000.00	360,000.00	3,450,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,310,000.00
1936	500,000.00	340,000.00	840,000.00	5,150,000.00
1937		320,000.00	320,000.00	5,470,000.00
1938	1,000,000.00	320,000.00	1,320,000.00	6,790,000.00
1939	1,000,000.00	280,000.00	1,280,000.00	8,070,000.00
1940	1,000,000.00	240,000.00	1,240,000.00	9,310,000.00
1941	1,000,000.00	200,000.00	1,200,000.00	10,510,000.00
1942		160,000.00	160,000.00	10,670,000.00
1943	1,000,000.00	160,000.00	1,160,000.00	11,830,000.00
1944	3,000,000.00	120,000.00	3,120,000.00	14,950,000.00
Total	$9,000,000.00	$5,950,000.00	$14,950,000.00	$14,950,000.00

The following statements represent the amounts to be retired and the amount of interest to be paid at each retirement and interest paying period during the life of the $24,000,000.00 bonds of the $100,000,000.00 Bond Issue sold to December 31, 1925:

TABLE L—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $24,000,000.00—4% BONDS SOLD TO DECEMBER 31, 1925.

Total bonds voted November 4, 1924	$100,000,000.00
Total bonds authorized for sale	100,000,000.00

Year in which principal is to be retired and interest paid.	Principal to be retired Mar. 1 each year.	Principal to be retired May 1 each year.	Total principal to be retired during year.	Interest to be paid Mar. 1 each year.	Interest to be paid May 1 each year.	Interest to be paid Sept. 1 each year.	Interest to be paid Nov. 1 each year.	Total interest payable each year.	Total payable all series each year.
1925					$53,333.33	$400,000.00	$80,000.00	$533,333.33	$ 533,333.33
1926				$400,000.00	80,000.00	400,000.00	80,000.00	960,000.00	960,000.00
1927				400,000.00	80,000.00	400,000.00	80,000.00	960,000.00	960,000.00
1928				400,000.00	80,000.00	400,000.00	80,000.00	960,000.00	960,000.00
1929				400,000.00	80,000.00	400,000.00	80,000.00	960,000.00	960,000.00
1930				400,000.00	80,000.00	400,000.00	80,000.00	960,000.00	960,000.00
1931				400,000.00	80,000.00	400,000.00	80,000.00	960,000.00	960,000.00
1932		$500,000.00	$500,000.00	400,000.00	80,000.00	400,000.00	70,000.00	950,000.00	1,450,000.00
1933		500,000.00	500,000.00	400,000.00	70,000.00	400,000.00	60,000.00	930,000.00	1,430,000.00
1934		500,000.00	500,000.00	400,000.00	60,000.00	400,000.00	50,000.00	910,000.00	1,410,000.00
1935		500,000.00	500,000.00	400,000.00	50,000.00	400,000.00	40,000.00	890,000.00	1,390,000.00
1936		500,000.00	500,000.00	400,000.00	40,000.00	400,000.00	30,000.00	870,000.00	1,370,000.00
1937		500,000.00	500,000.00	400,000.00	30,000.00	400,000.00	20,000.00	850,000.00	1,350,000.00
1938		500,000.00	500,000.00	400,000.00	20,000.00	400,000.00	10,000.00	830,000.00	1,330,000.00
1939		500,000.00	500,000.00	400,000.00	10,000.00	400,000.00		810,000.00	1,310,000.00
1940				400,000.00		400,000.00		800,000.00	800,000.00
1941				400,000.00		400,000.00		800,000.00	800,000.00
1942				400,000.00		400,000.00		800,000.00	800,000.00
1943				400,000.00		400,000.00		800,000.00	800,000.00
1944				400,000.00		400,000.00		800,000.00	800,000.00
1945	$2,000,000.00		2,000,000.00	400,000.00		360,000.00		760,000.00	2,760,000.00
1946	2,000,000.00		2,000,000.00	360,000.00		320,000.00		680,000.00	2,680,000.00
1947	2,000,000.00		2,000,000.00	320,000.00		280,000.00		600,000.00	2,600,000.00
1948	2,000,000.00		2,000,000.00	280,000.00		240,000.00		520,000.00	2,520,000.00
1949	2,000,000.00		2,000,000.00	240,000.00		200,000.00		440,000.00	2,440,000.00
1950	2,000,000.00		2,000,000.00	200,000.00		160,000.00		360,000.00	2,360,000.00
1951	2,000,000.00		2,000,000.00	160,000.00		120,000.00		280,000.00	2,280,000.00
1952	2,000,000.00		2,000,000.00	120,000.00		80,000.00		200,000.00	2,200,000.00
1953	2,000,000.00		2,000,000.00	80,000.00		40,000.00		120,000.00	2,120,000.00
1954	2,000,000.00		2,000,000.00	40,000.00				40,000.00	2,040,000.00
Total	$20,000,000.00	$4,000,000.00	$24,000,000.00	$9,800,000.00	$893,333.33	$9,800,000.00	$840,000.00	$21,333,333.33	$45,333,333.33

The following statement represents the amount derived from the sale of $24,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1925:

TABLE LI—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $100,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Amount deposited in bond fund.	Amount deposited in road fund
1924	Dec. 30	97.5575	4.29	$ 4,000,000.00	$ 3,913,411.20	$3,902,300.00	$ 11,111.20
1925	May 20	99.881	4.008	10,000,000.00	10,088,100.00	9,988,100.00	100,000.00
1925	Sept. 1	96.422	4.24	10,000,000.00	9,845,533.33	9,642,200.00	203,333.33
Total		98.025	4.079	$24,000,000.00	$23,847,044.53	$23,532,600.00	$314,444.53

The following statement represents the appropriations made by the General Assembly which are payable from the proceeds of the $100,000,000.00 Bond Issue:

TABLE LII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 1—$4,000,000.00—4% BONDS.

Date of sale—Dec. 30, 1924. Date of issue—Jan. 1, 1925. Rate $97.5575. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925		$53,333.33	$80,000.00	$133,333.33	$133,333.33
1926		80,000.00	80,000.00	160,000.00	160,000.00
1927		80,000.00	80,000.00	160,000.00	160,000.00
1928		80,000.00	80,000.00	160,000.00	160,000.00
1929		80,000.00	80,000.00	160,000.00	160,000.00
1930		80,000.00	80,000.00	160,000.00	160,000.00
1931		80,000.00	80,000.00	160,000.00	160,000.00
1932	$500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1933	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1934	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1935	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1936	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1937	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1938	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1939	500,000.00	10,000.00		10,000.00	510,000.00
Total	$4,000,000.00	$893,333.33	$840,000.00	$1,733,333.33	$5,733,333.33

TABLE LIII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SERIES NO. 2—$10,000,000.00—4% BONDS.

Date of sale—May 20, 1925. Date of issue—Mar. 1, 1925. Rate $99.881. Yield 4.008.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LIV—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST—CALCULATIONS, SERIES NO. 3—$10,000,000.00—4% BONDS.

Date of sale—Sept. 1, 1925. Date of issue—Mar. 1, 1925. Rate $96.422. Yield 4.24.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000.000.00	180,000.00	160,000.00	340,000.00	1,340.000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180.000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20.000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19.800,000.00

TABLE LV—APPROPRIATIONS PAYABLE FROM $100,000,000.00 BOND ISSUE FUND.

Year.	For construction.	Amount lapsed Oct. 1, 1925.
1923	$100,000,000.00	$96,000,000.00
1925	96,000,000.00	Re-appropriation
Total	$196,000,000.00	$96,000,000.00

The following statement represents the expenditures which were made during the calendar year 1925 from the proceeds of $24,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1925:

TABLE LVI—EXPENDITURES FROM $100,000,000.00 BOND ISSUE FUND, 1925.

Year.	Administration and engineering.	Construction.	Equipment.	Total.
1925	$1,574,167.12	$19,758,908.62	$329,852.54	$21,662,928.28

The following statement shows a comparison of the amounts spent each month from all funds during the calendar years 1922, 1923, 1924 and 1925:

TABLE LVII—COMPARISON OF TOTAL EXPENDITURES ALL FUNDS WITH RATIOS.

	1922	Monthly per cent of total.	1923	Monthly per cent of total.	1924	Monthly per cent of total.	1925	Monthly per cent of total.	Total.
January	$ 771,740.43	3.44	$ 752,978.66	2.43	$1,418,700.91	3.60	$1,939,357.92	5.80	$ 4,882,777.92
February	415,476.44	1.85	1,163,351.98	3.75	1,837,899.83	4.66	1,298,641.97	3.88	4,715,370.22
March	1,016,990.06	4.53	1,890,509.12	6.09	1,931,498.05	4.89	1,617,773.26	4.84	6,456,770.49
April	847,449.13	3.77	1,668,267.59	5.37	2,746,372.08	6.96	2,290,267.08	6.86	7,552,355.88
May	1.623,975.48	7.23	2,493,564.15	8.03	3,847,583.60	9.75	3,340,078.10	10.01	11,305,201.33
June	2,724,384.23	12.13	3,419,818.32	11.02	4,181,769.51	10.60	4,655,851.23	13.95	14,981,823.29
July	3,485,829.92	15.52	3,832.940.41	12.35	4,866,445.69	12.33	4,604,546.92	13.79	16,789,762.94
August	3,267,294.76	14.55	4,115,100.96	13.26	4,919,209.17	12.47	4,249,642.45	12.74	16,551,247.34
September	2,411,038.51	10.74	3,972,466.54	12.80	5,218,135.58	13.22	3,924,788.71	11.76	15,526,429.34
October	2,389,549.29	10.64	1,881,532.49	6.06	4,645,517.55	11.77	2,792,926.71	8.36	11,709,526.04
November	2,162,187.90	9.63	3,761,878.20	12.12	3,006,654.78	7.61	1,465,260.57	4.39	10,395,981.45
December	1,337,744.36	5.97	2,089,460.87	6.72	842,548.84	2.14	1,209,544.33	3.62	5,479,298.40
Total	$22,453,660.51	100.00	$31,041,869.29	100.00	$39,462,335.59	100.00	$33,388,679.25	100.00	$126,346,544.64

3. PERMITS, FRANCHISES, LEASES, AND RENTALS.—All requests for permits or franchises for the use of the State Highways for the construction of entrances to private properties, gasoline filling stations, lunch stands and to companies and corporations for the privilege of placing and maintaining telephone and telegraph lines, electric power transmission lines, water mains, cables, conduits, and sewers are carefully investigated as to their desirability and legal aspects before being finally approved by the Chief Highway Engineer. There were 1,673 permits of this nature handled during the calendar year 1925.

All arrangements for the renting or leasing of grounds or buildings used by the various sections of the Division of Highways are made by this Bureau and records are kept of such rented or leased properties.

4. CLAIMS, LIENS, AND ASSIGNMENTS.—All liens, claims, and assignments filed against contractors for labor, material, or equipment furnished by outside parties are received, recorded and filed in this office. A detailed record of such claims against each contractor for each section of work under contract is kept on file and are referred to before payments are made to contractors.

5. REFUNDS TO COUNTIES.—The following statement shows the amount appropriated, refunded and lapsed under House Bill No. 766, Refunds to Counties:

TABLE LVIII—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN STATE BOND ISSUE SYSTEM, HOUSE BILL 766.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bond	$114,837.53	$114,837.53	
Boone	3,937.34		$ 3,937.34
Bureau	6,836.42		6,836.42
Cass	5,851.17		5,851.17
Champaign	74,453.33	22,629.13	51,824.20
Clark	126,259.34	126,258.68	.66
Clinton	6,745.00		6.745.00
Coles	36,876.16		36,876.16
Cook	687,935.42	498,954.97	188,980.45
Crawford	10,014.12		10,014.12
Cumberland	94,209.05	92,312.41	1,896.64
DeKalb	51,509.00	51,509.00	
Douglas	8,993.93		8,993.93
DuPage	82,042.00	82,042.00	
Edgar	1,577.20		1,577.20
Edwards	1,498.69		1,498.69
Effingham	106,181.45	98,590.35	7,591.10
Fayette	160,526.53	147,258.26	13,268.27
Fulton	28,585.10		28,585.10
Iroquois	65,788.51	65,788.39	.12
Jasper	3,350.74		3,350.74
Jefferson	4,168.35		4.168.35
Kane	113,639.55	113,639.55	
Kankakee	13,239.47	13,239.47	
Lake	143,681.62	143,681.62	
Lawrence	6,373.44		6,373.44
Lee	75,726.00	75,708.81	17.19
Livingston	13,119.87		13,119.87
Logan	3,058.65		3,058.65
Macoupin	73,176.31	17,495.88	55,680.43
Madison	206,032.34	174,200.20	31,832.14
Mason	55,882.46		55,882.46

TABLE LVIII—Concluded.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Menard	$ 51,117.01		$ 51,117.01
Mercer	3,870.00		3,870.00
Monroe	7,035.04		7,035.04
Morgan	7,966.07		7,966.07
Ogle	47,816.63	$ 12,597.86	35,218.77
Peoria	69,285.00	69,043.80	241.20
Piatt	21,027.69		21,027.69
Rock Isand	4,650.54		4,650.54
St. Clair	84,210.92	84.210.92	
Sangamon	131,067.24	123,457.62	7,609.62
Schuyler	14,033.49		14,033.49
Stephenson	20,571.79		20,571.79
Tazewell	145,468.89	132,835.12	12,633.77
Vermilion	651,044.41	544,156.60	106,887.81
Warren	41,142.06	31,470.74	9,671.32
Whiteside	75,460.88	73,622.25	1,838.63
Will	21,521.00	16,600.68	4,920.32
Williamson	62,392.88		62,392.88
Winnebago	43,594.60	43,594.60	
Total	$3,889,382.23	$2,969,736.44	$919,645.79

The following statement represents the amounts appropriated, refunded and lapsed under House Bill No. 867, Refunds to Counties:

TABLE LIX—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 867.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bureau	$ 6,055.66		$ 6,055.66
Carroll	15,090.56		15,090.56
Clinton	6,745.00		6.745.00
Coles	7,869.21		7,869.21
Cook	492,675.23	$ 18,268.01	474,407.22
DeKalb	60,841.26	3,450.76	57,390.50
Edgar	15,298.92		15,298.92
Franklin	10,493.36		10,493.36
Fulton	8,030.00		8,030.00
Grundy	75,252.00	50,000.00	25,252.00
Jackson	5,909.92		5,909.92
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	84,480.35	72,448.07	12,032.28
Kankakee	62,881.21	62,881.21	
Lake	388,961.15	337,156.27	51,804.88
LaSalle	114,736.57		114,736.57
Lawrence	19,757.21		19,757.21
Lee	25,004.86		25,004.86
Livingston	13,912.26		13,912.26
McHenry	10,647.17		10,647.17
Macoupin	127,876.00		127,876.00
Madison	389,115.77	234,129.24	154,986.53
Marshall	4,307.27		4,307.27
Menard	58,894.30	25,000.00	33,894.30
Ogle	26,288.20		26,288.20
Peoria	170,329.32		170,329.32
Rock Island	15,558.05		15,558.05
St. Clair	133,153.61	118,506.05	14,647.56
Sangamon	164,639.00	156,009.58	8,629.42
Shelby	18,573.03		18,573.03
Whiteside	4,732.04		4,732.04
Will	183,290.57	165,712.27	17,578.30
Winnebago	124,196.40	70,323.39	53,873.01
Total	$2,869,289.87	$1,313,884.85	$1,555,405.02

The following statement shows the amounts appropriated, refunded and lapsed under House Bill No. 822, Refunds to Counties:

TABLE LX—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 822.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1925.
Adams	$ 16,256.06		$ 16.256.06
Bond	4,438.92	$ 4,438,92	
Boone	3,762.32	3,762.32	
Bureau	12,894.26	12,854.54	39.72
Carroll	10,024.77	6,551.10	3,473.67
Cass	5,851.17		5,851.17
Champaign	51,746.58	48,535.18	3,211.40
Coles	33,738.22	32,480.92	1,257.30
Cook	984,393.21	720,389.28	264,003.93
Cumberland	6,261.78		6,261.78
DeKalb	58,192.39	23,381.70	34,810.69
DuPage	45,207.17	40,858.47	4,348.70
Edgar	16,876.12	14,148.08	2,728.04
Edwards	1,498.69		1,498.69
Effingham	5,656.37	3,918.26	1,738.11
Ford	5,738.29		5,738.29
Fulton	33,123.80	32,540.30	583.50
Grundy	55,734.87	30,734.87	25,000.00
Iroquois	18,843.00		18,843.00
Jersey	2,930.72		2,930.72
Kane	393,922.37	165,971.21	227,950.16
Kankakee	21,044.78	17,968.30	3,076.48
LaSalle	27,281.15		27,281.15
Lake	214,144.81	85,625.17	128,519.64
Lee	25,004.86	25,004.86	
Livingston	19,160.77	19,160.77	
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Macoupin	162,902.24	162,406.36	495.88
Madison	302,991.28	172,847.39	130,143.89
Marion	1,593.66		1,593.66
Marshall	45,601.86		45,601.86
Mason	54,066.22	54,066.22	
McHenry	10,191.63		10,191.63
Menard	44,773.74	26,242.44	18,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.04	1,000.00	6,035.04
Morgan	7,966.07		7,956.07
Ogle	78,613.10	64,767.39	13,845.71
Peoria	122,739.77	80,818.16	41,921.61
Piatt	11,235.62	11,235.62	
Pike	8,325.16		8,325.16
Putnam	19,073.92	7,000.00	12,073.92
Rock Island	3,029.82		3,029.82
Schuyler	17,583.40	6,929.94	10,653.46
Shelby	17,366.56		17,366.56
St. Clair	483,564.11	483,339.78	224.33
Stephenson	12,838.53	12,838.53	
Tazewell	12,633.48		12,633.48
Vermilion	155,526.79		155,526.79
Warren	38,405.66		38,405.66
Whiteside	4,732.04	4,732.04	
Will	194,128.06	100,340.09	93,787.97
Williamson	66,863.40	55,169.70	11,693.70
Winnebago	61,468.68	61,468.68	
Total	$4,025,632.56	$2,593,527.59	$1,432,104.97

The following statement shows the amounts appropriated, refunded and balances remaining due the various counties at December 31, 1925 under Senate Bill No. 515, Refunds to Counties:

TABLE LXI—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, SENATE BILL 515.

County.	Amount appropriated.	Amounts refunded.	Appropriation balance Dec. 31, 1925.
Adams	$ 16,256.07		$ 16,256.07
Carroll	4,000.00	$ 2,628.29	1,371.71
Cass	3,450.54		3,450.54
Coles	1,888.97	1,888.97	
Cook	505,985.35		505,985.35
Douglas	2,949.33		2,949.33
Edwards	1,498.69	1,498.69	
Effingham	6,297.35		6,297.35
Ford	5,738.29		5,738.29
Fulton	32,540.30		32,540.30
Iroquois	7,498.00		7,498.00
Jackson	942.00		942.00
Jefferson	1,125.28		1,125.28
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	248,924.77	3,531.05	245,393.72
Kankakee	147,419.17		147,419.17
Lake	50,000.00	41,625.86	8,374.14
LaSalle	21,566.89		21,566.89
Lee	25,004.86		25,004.86
Livingston	26,445.09	7,421.01	19,024.08
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Madison	23,054.63		23,054.63
Marion	1,895.40		1,895.40
Marshall	45,598.82		45,598.82
Mason	63,814.17		63,814.17
McHenry	10,161.59		10,161.59
McLean	47,356.52		47,356.52
Menard	3,531.30		3,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.03	3,000.00	4,035.03
Morgan	7,966.07		7,966.07
Peoria	46,529.39		46,529.39
Piatt	11,235.62		11,235.62
Pike	8,066.39		8,066.39
Putnam	19,073.92		19,072.92
Rock Island	2,746.47		2,736.47
Sangamon	572,109.87		572,109.87
Schuyler	25,802.02		25,802.02
Shelby	17,554.03		17,554.03
St. Clair	449,998.24		449,998.24
Stephenson	7,726.37		7,726.37
Tazewell	12,633.48		12,633.48
Vermilion	19,500.00		19,500.00
Will	109,415.59	20,000.00	89,415.59
Williamson	52,133.40		52,133.40
Total	$2,704,818.95	$81,593.87	$2,623,225.08

6. DISTRIBUTION OF CEMENT TO STATE CONTRACTS.—During the calendar year 1925 the State contracted for 4,622,664 barrels of cement of which 3,010,300 barrels were shipped to the various construction jobs throughout the State.

The payment of all cement furnished for State road work is handled in this Bureau. A record and follow up system for final disposition of cars is kept and a final check is made with the laboratory and district engineer on shipments and transfers to and from the various construction sections.

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NINTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

January 1, 1926

TO

December 31, 1926

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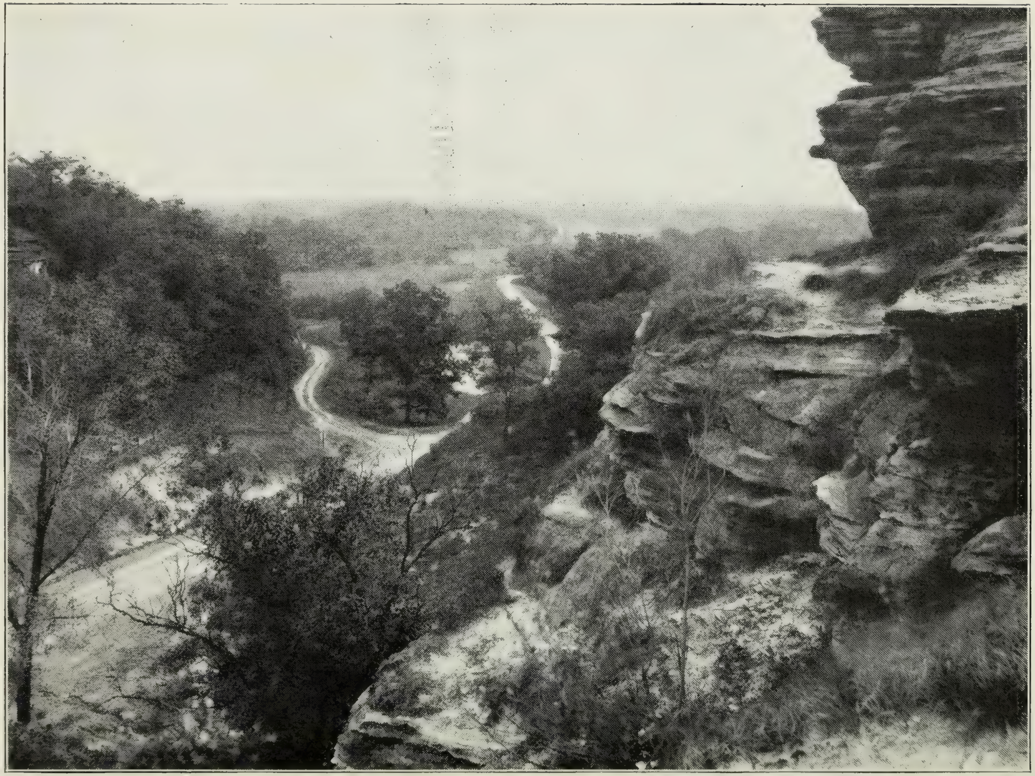
NINTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

DIVISION OF HIGHWAYS



After Construction: Bond Route 2, Section 38, looking north from Castle Rock, Ogle County.

NINTH ANNUAL REPORT

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS.

Cornelius R. Miller, *Director.*

Don Garrison, *Assistant Director.*

DIVISION OF HIGHWAYS.

Frank T. Sheets, *Chief Highway Engineer and Acting Superintendent of Highways.*

R. R. Benedict, *Assistant Chief Highway Engineer.*

BUREAU CHIEFS.

H. E. Surman, *Engineer of Design.*

G. F. Burch, *Engineer of Bridges.*

C. M. Hathaway, *Engineer of Construction.*

Fred Tarrant, *Engineer of Maintenance.*

V. L. Glover, *Engineer of Materials.*

J. M. McCoy, *Chief Clerk.*

DISTRICT ENGINEERS.

District No. 1—G. N. Lamb, Elgin, Ill.

District No. 2—O. F. Goeke, Dixon, Ill.

District No. 3—M. J. Fleming, Ottawa, Ill.

District No. 4—Theo. Plack, Peoria, Ill.

District No. 5—Chas. H. Apple, Paris, Ill.

District No. 6—K. N. Evans, Springfield, Ill.

District No. 7—P. F. Jervis, Effingham, Ill.

District No. 8—C. M. Slaymaker, E. St. Louis, Ill.

District No. 9—L. Schwartz, Carbondale, Ill.

CONTENTS.

PAGE.
I. GENERAL 1
1. The Division 1
2. Organization 1
3. Highway Development 1
4. Work Accomplished During 1926 1
5. Detailed Report by Bureaus 5

II. BUREAU OF DESIGN 5
A. ROAD SECTION 5
1. Reconnoissance Surveys 5
2. Surveys and Plans 5
3. Contracts Awarded 6
4. Unit Prices 7
5. Responsibility of Bidders 10
6. Changes in Design 10
7. Pavement Cross Sections 10
8. Revisions in Specifications 10
9. Federal Aid 11
10. State Aid 16
11. House Bill 433 17
12. House Bill 536 18
13. Refunds to Counties 19
14. Grade Separations 19
15. Special Reports, Maps, etc 19
B. BBIDGE SECTION 19
1. Activities 19
2. Plans Prepared 22
3. Contracts Awarded 23
4. Classification of Bridge Work 23
5. Bridges Completed 23

III. BUREAU OF CONSTRUCTION 30
1. Bureau of Construction 30
2. 1926 Construction Program 30
3. Construction Accomplishments 31
4. Transportation, Labor and Weather Conditions 31
5. Cost of 18-Foot Concrete Pavement 34
6. Construction Policies 34
7. Cement Shipments 38
8. Day Labor 38
9. Penitentiary Stone 38

IV. BUREAU OF MAINTENANCE 47
1. Organization and Duties 47
2. Flood Conditions Encountered During 1926 49
3. Outline of Activities—1926 49
4. Permits and Franchises 50
5. Cost Accounting 50
6. Snow Removal 56
7. Maintenance of Surfaced Roads 59
8. Maintenance of Large Bridges 74
9. Maintenance of Detours, Unpaved and Temporary Routes 74
10. Additions and Betterments 82
11. Policing of the State Highway System 83

V. BUREAU OF MATERIALS 86
1. General 86
2. Field Inspection of Materials 86
3. Laboratory Tests of Samples 93
4. Research on Quality of Materials 94
5. Research on Methods of Testing 95
6. Research on Pavement Design and Construction 96
7. Preparation of Specifications and Reports 97
8. Departmental Service 97

PAGE.
VI. BUREAU OF AUDITS 99
1. Accounting and Auditing 99
2. Reports and Financial Estimates 100
3. Permits, Franchises, Leases and Rentals 120
4. Claims, Liens and Assignments 120
5. Refunds to Counties 120
6. Distribution of Cement to State Contracts 123

TABLES.

No. PAGE.
I. Federal Aid and State Bond Issue Contracts Awarded 6
II. Straight State Aid Contracts Awarded 6
III. 15d Contracts Awarded 7
IV. Contracts Awarded for County 15d work, 1926 7
V. Federal Aid Allotments 11
VI. Status of Federal Aid Funds, January 1, 1927 14
VII. Status of State Aid Mileage 16
VIII. Contracts Awarded Under House Bill 433 18
IX. Grade Separation Cases Settled January 1, 1919, to January 1, 1927. 20
X. A Summary of the County and State Bridge Work Carried on from 1906 to 1926 22
XI. Summary of Mileage Constructed During 1926 30
XII. General Summary of 1926 Construction 31
XIII. Trial Balance Covering Transactions of the Bureau of Maintenance for the Calendar Year 1926 51
XIV. Statement Showing Cost of Snow Removal for the Northern, Central and Southern Zones for the Calendar Year 1926 57
XV. Statement Showing Cost for Marking Routes Through Cities in All Districts for the Calendar Year 1926 64
XVI. Statement Showing Comparison of Mileages and Costs on Per Mile Basis by Types and Units for Calendar Year 1926 65
XVII. Statement Showing Comparison of Miles and Cost of Various Types Maintained During the Calendar Year 1926 66
XVIII. Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Surfaced Roads Maintained on a Calendar Year Basis for 1926 in All Districts 67
XIX. Consolidated Statement Showing Cost of Maintenance and Upkeep of 5,006.99 Miles of Concrete Roads in All Districts for the Calendar Year 1926 68
XX. Consolidated Statement Showing Cost of Maintenance and Upkeep of 161.93 Miles of Brick Roads in All Districts for the Calendar Year 1926 69
XXI. Consolidated Statement Showing Cost of Maintenance and Upkeep of 48.18 Miles Bit. Concrete Roads in All Districts for the Calendar Year 1926 70
XXII. Consolidated Statement Showing Cost of Maintenance and Upkeep of 25.85 Miles of Bit. Macadam Roads in All Districts for the Calendar Year 1926 71
XXIII. Consolidated Statement Showing Cost of Maintenance and Upkeep of 36.73 Miles of W. B. Macadam Roads in All Districts for the Calendar Year 1926 72
XXIV. Consolidated Statement Showing Cost of Maintenance and Upkeep of 160.32 Miles of Gravel Roads in All Districts for the Calendar Year 1926 73
XXV. Statement Showing Cost of Maintenance and Upkeep of Bridges Over 100-Foot Span, Located in Various Districts, for the Calendar Year 1926 77
XXVI. Consolidated Statement Showing the Cost of Maintenance and Upkeep of All Types of Detours, Unpaved and Temporary Routes for the Calendar Year 1926 80
XXVII. Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Detour Roads Maintained on a Calendar Year Basis for 1926, in All Districts 81
XXVIII. Statement Showing Amounts Expended for Additions and Betterments During the Calendar Year 1926 83
XXIX. Annual Report of State Highway Patrol Officers for the Year 1926.. 83

No. PAGE.
XXX. Statement Showing Quantities of Materials Inspected at Plants for Highway Work in Illinois and Unit Cost of Inspection for the Calendar Year 1926 87
XXXI. Statement Showing Quantity of Materials Inspected for Other Departments of the State of Illinois, and Also Other States, During the Calendar Year 1926 88
XXXII. Samples of Materials Tested in General Laboratory, 1926 94
XXXIII. Showing the Number of Films, Prints and Slides Prepared for the Various Bureaus 97
XXXIV. Report Covering Paint Handled by Bureau of Materials During the Calendar Year 1926, for Highway Work in Illinois 98
XXXV. Statement Showing Collections of the Division of Highways and Sources from which Collected from January 1, 1926 to December 31, 1926 99
XXXVI. Road Fund Revenue Deposited in State Treasury from 1911 to 1926, inclusive 100
XXXVII. List of Appropriations Payable from the Road Fund by the General Assembly for the Years 1913 to 1926, inclusive 101
XXXVIII. Statement Showing Expenditures from the Road Fund for the Years 1914 to 1926, inclusive 102
XXXIX. Statement Showing Motor Fee Receipts and Registration of Motor Vehicles for the Years 1911 to 1926, inclusive 103
XL. Statement Showing Motor Fee Receipts by Months for the Years 1923, 1924, 1925 and 1926 103
XLI. Statement Showing Motor Fees Collected by Counties for the Years 1923, 1924, 1925 and 1926 104
XLII. Statement Showing Federal Aid Funds Allotted to Illinois by the U. S. Government, 1917 to 1928, inclusive 105
XLIII. Statement Showing Bond Fund Revenue Deposited with the State Treasurer as Derived from the Sale of $60,000,000 Bond Issue 106
XLIV. Statement Showing Appropriations Payable from the $60 000,000 Bond Issue Funds 106
XLV. Statement Showing Expenditures from $60,000,000 Bond Issue Fund 106
XLVI. Statement Showing the Amount of Principal to be Retired and Interest Paid on All Series of the $60,000,000 Bond Issue 107
XLVII. Statement Showing the Retirement and Interest Payments of Series No. 1, $5,000,000 Bonds of the $60,000 000 Bond Issue Sold October 25, 1921 107
XLVIII. Statement Showing the Retirement and Interest Payments of Series No. 2, $6,000,000 Bonds of the $60 000,000 Bond Issue Sold April 13, 1922 108
XLIX. Statement Showing the Retirement and Interest Payments of Series No. 3, $6,000,000 Bonds of the $60,000 000 Bond Issue Sold September 18, 1922 108
L. Statement Showing the Retirement and Interest Payments of Series No. 4, $6,000,000 Bonds of the $60 000,000 Bond Issue Sold February 20, 1923 109
LI. Statement Showing the Retirement and Interest Payments of Series No. 5, $7,000,000 Bonds of the $60,000 000 Bond Issue Sold May 25, 1923 109
LII. Statement Showing the Retirement and Interest Payments of Series No. 6, $6,000,000 Bonds of the $60 000,000 Bond Issue Sold October 16, 1923 110
LIII. Statement Showing the Retirement and Interest Payments of Series No. 7, $6,000,000 Bonds of the $60,000 000 Bond Issue Sold December 22, 1923 110
LIV. Statement Showing the Retirement and Interest Payments of Series No. 8, $9,000,000 Bonds of the $60 000,000 Bond Issue Sold June 3, 1924 111
LV. Statement Showing the Retirement and Interest Payments of Series No. 9, $9,000,000 Bonds of the $60,000 000 Bond Issue Sold August 15, 1924 111
LVI. Statement Showing the Bond Fund Revenue Derived from the Sale of $29,000,000 of the $100,000.000 Bond Issue 112
LVII. Statement Showing the Appropriations Payable from the $100,000,000 Bond Issue 112
LVIII. Statement Showing the Expenditures from the $100,000,000 Bond Bond Issue 112
LIX. Statement Showing Highway Bond Retirement and Interest Calculations on All Series of $29,000,000 of the $100,000,000 Bond Issue, 4% Bonds Sold to December 31, 1926 113

No. PAGE.
LX. Statement Showing the Retirement and Interest Payments of Series No. 1, $4,000,000 Bonds of the $100,000,000 Bond Issue Sold December 30, 1924 114
LXI. Statement Showing the Retirement and Interest Payments of Series No. 2 $10,000,000 Bonds of the $100,000,000 Bond Issue Sold May 20, 1925 114
LXII. Statement Showing the Retirement and Interest Payments of Series No. 3, $10,000,000 Bonds of the $100,000,000 Bond Issue Sold September 1, 1925 115
LXIII. Statement Showing the Retirement and Interest Payments of Series No. 4, $5,000,000 Bonds of the $100,000,000 Bond Issue Sold February 17, 1926 116
LXIV. Statement Showing Highway Bond Retirement and Interest Calculations on All Series of the $60,000,000 and on $29,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1926 117
LXV. Statement Showing Highway Bond Retirement and Interest Calculations, Showing the Amount Due at Each Retirement Period on the Entire $60,0000,000 Bond Issue plus $29,000,000 of the $100 000,000 Bond Issue Sold to December 31, 1926 118
LXVI. Statement Showing Highway Bond Retirement and Interest Calculations, Showing the Amount of Interest Due at Each Interest Paying Period on the $60,000,000 Bond Issue plus $29,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1926 119
LXVII. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 766 120
LXVIII. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 867 121
LXIX. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 822 122
LXX. Statement Showing Amounts Appropriated, Refunded and Lapsed Under Senate Bill 515 123

ILLUSTRATIONS.

FIG. PAGE.

After Construction: Bond Route 2, Section 38, looking North from Castle Rock, Ogle County.....Frontispiece

1. As Illinois looked January 1, 1921..... 2
2. As Illinois looked December 31, 1926..... 3
3. Chart Showing Roads Built in Illinois..... 4
4. Graphs Showing Unit Price Range on Principal Items in Highway Construction During 1926..... 8
5. Graphs Showing Unit Price Range on Principal Items in Highway Construction, 1919 to 1926..... 9
6. Typical Cross Sections in Use, January 1, 1926, to December 31, 1926..... 12
7. Typical Cross Sections in Use, January 1, 1925, to December 31, 1926..... 13
8. Kaskaskia River Bridge at Evansville..... 25
9. Spoon River Bridge Near Maquon..... 26
10. Rock River Bridge at Rockton..... 26
11. Spoon River Bridge Near Blyton..... 27
12. C. & N. W. Overhead, East of Spring Valley..... 27
13. Spoon River Bridge Near Duncan Mills..... 28
14. The Fox River Near Sheridan, LaSalle County. A good location for an arch bridge..... 28
15. West Station Street Bridge over Kankakee River on Route 17.....29
16. Curves Showing Progress of Pavement Construction During 1926 in Comparison with Previous Years..... 32
17. Curves Showing Weekly Progress in Pavement Construction in 1926..... 33
18. City Widening Job in Marseilles, LaSalle County, on Bond Route 7, Section G-W..... 34
19. Mattison Subway. 4 Miles West of Chicago Heights on Lincoln Highway, Cook County; Bond Route 22, Section 42-S..... 35
20. Ela Viaduct Over C. & N. W. Tracks at Barrington, Lake County..... 35
21. Pavement, Grading and Bridges Completed by Districts, Including S. B. I., Fed. Aid, and 15d, from January 1, 1921 to January 1, 1927..... 36
22. Flood Conditions Looking West at Sangamon River Bridge, ½ Mile East of Petersburg, Menard County..... 37
23. Cost Analyses Diagram of 18-Foot Concrete Pavement..... 38
24. Calyx Core Drill Used for Checking Pavement Thickness..... 39
25. Curing of Newly Laid Pavement with Burlap..... 40
26. Removing Laitance from Pavement with Straight Edge..... 40
27. Comparative Curves Showing Monthly Cement Shipments for 1924, 1925 and 1926..... 41
28. Guard Fence Constructed North of Chillicothe, Peoria County, on Route 29, Section M-4..... 41
29. Guard Fence Constructed in Adams County on Route 36, Section 10..... 42
30. Guard Fence Constructed near Athens, Menard County on Route 24..... 42
31. Map Showing Shipments of Crushed Stone from the Two State Penitentiaries..... 43
32. Before Construction: Bond Route 36, Section 10, 2 Miles South of Ursa, Adams County..... 44
33. After Construction: Bond Route 36, Section 10, 2 Miles South of Ursa, Adams County..... 44
34. Before Construction: Bond Route 3, Section 51 Greene County..... 45
35. After Construction: Bond Route 3, Section 51, Greene County..... 45
36. Before Construction: Bond Route 36, Section 22, Scott County..... 46
37. After Construction: Bond Route 36, Section 22, Scott County..... 46
38. Bureau of Maintenance Organization Chart..... 47
39. A Typical 1926 Flood Condition..... 48
40. Graph Showing Miles of Roads Maintained by the Bureau of Maintenance by Districts for the Calendar Year 1926..... 52

FIG. PAGE.
41. Chart Showing Division of Costs of Bureau of Maintenance According to Activities for the Calendar Year 1926 53
42. Chart Showing Source of Expenditures and Total Costs of the Bureau of Maintenance for the Calendar Year 1926 54
43. Map Showing Districts Affected by the Snow Storm of November 17 and 18, 1926 55
44. Map Showing Districts Affected by the Snow Storm of November 21 and 22 · 1926 55
45. Map Showing Districts Affected by the Snow Storm of December 22, 1926 .. 55
46. Map Showing Districts Affected by the Snow Storm of December 25, 1926 .. 55
47. A Typical Snow Condition During 1926 56
48. Traffic Line Marking Machine 58
49. View of State Road Showing Center Line Made with the Marking Machine. 58
50. Typical Roadside Route Marker 61
51. Typical Telephone Pole Route Marker 61
52. Typical City Limit Objective and Distance Marker 61
53. Typical City Route and Objective Marker 61
54. Typical Route Junction Marker 62
55. Typical City Limits Marker 62
56. Typical Square Cross Road Marker 62
57. Typical Diamond Shaped Curve Marker 62
58. Typical Diamond Shaped Junction Marker 63
59. Typical Diamond Shaped R. R. Crossing Marker 63
60. Typical Octagonal Shaped Danger Marker 63
61. Typical Octagonal Shaped Stop Marker 63
62. Typical Grade Crossing Pavement Markings 82
63. Chart Showing Division of Mileage of Surfaced Roads Maintained for the Calendar Year 1926 75
64. Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on Surfaced Roads for 1926 76
65. Chart Showing Division of Mileage of Detour Roads Maintained for the Calendar Year 1926 78
66. Chart Showing Division of Costs of Maintaining Detours, Unpaved and Temporary Routes for the Calendar Year 1926 79
67. Chart Showing Division of Costs of Highway Police Officers for the Calendar Year 1926 84
68. Highway Patrol Officer Weighing an Overloaded Truck 85
69. Chart Showing Quantity of Materials Inspected and Unit Costs of Inspection for the Calendar Years 1919 to 1926, Inclusive 89
70. Chart Showing the Relative Proportion of the Various Activities of the Bureau of Materials by Distribution of Expense, for the Calendar Years 1920 to 1926, Inclusive 90
71. Standard Field Equipment Furnished Material Inspectors 91
72. Experimental Paint Fence 95

DIVISION OF HIGHWAYS.

Frank T. Sheets, *Chief Highway Engineer.*

I. GENERAL.

This report contains a summary of the activities of the Division of Highways for the calendar year ending December 31, 1926, and is submitted as a part of the Administrative Report required under Section 25 of the Civil Administrative Code.

1. THE DIVISION.—The Division of Highways is a statutory body having immediate control and supervision of the location, construction and maintenance of State highways. It is charged with the administration of the provisions of the $60,000,000 Bond Issue Act of 1918 and the $100,000,000 Bond Issue Act of 1924.

2. ORGANIZATION.—The Division of Highways is a part of the Department of Public Works and Buildings and is administered by a Superintendent of Highways, a Chief Highway Engineer, and an Assistant Chief Highway Engineer. These officers are assisted by a staff consisting of an Engineer of Design, an Engineer of Bridges, an Engineer of Construction, an Engineer of Maintenance, an Engineer of Materials, and a Chief Clerk.

The Administrative functions of the Division are handled through six Bureaus: The Bureau of Design, which is divided into a Road Section and a Bridge Section; and the Bureaus of Construction, Maintenance, Materials and Audits. These Bureaus are in charge of the staff officers named above.

The State is divided into nine highway districts, with a District Engineer in charge of each, who works with each Bureau insofar as his duties concern that Bureau.

3. HIGHWAY DEVELOPMENT.—The total mileage of hard-surfaced roads built in Illinois in the past thirteen years is 6,040.92 miles, of this total 80 per cent has been completed during the past six years, or four times as many miles of hard-surfaced roads have been completed during the administration of Governor Len Small as were completed in the previous seven years. Figures 1 and 2 show the progress made in the construction of hard-surfaced roads in Illinois from January 1, 1921, to January 1, 1927. Figure 3 shows the mileage of pavement laid each year from 1914 to 1926, inclusive.

4. WORK ACCOMPLISHED DURING 1926.—The mileage of hard-surfaced roads constructed during the year 1926 was relatively low compared to the mileage constructed during the previous four years, due entirely to legal difficulties encountered in the completion of the $60,000,000 Bond Issue System. It was stated in the Eighth Annual

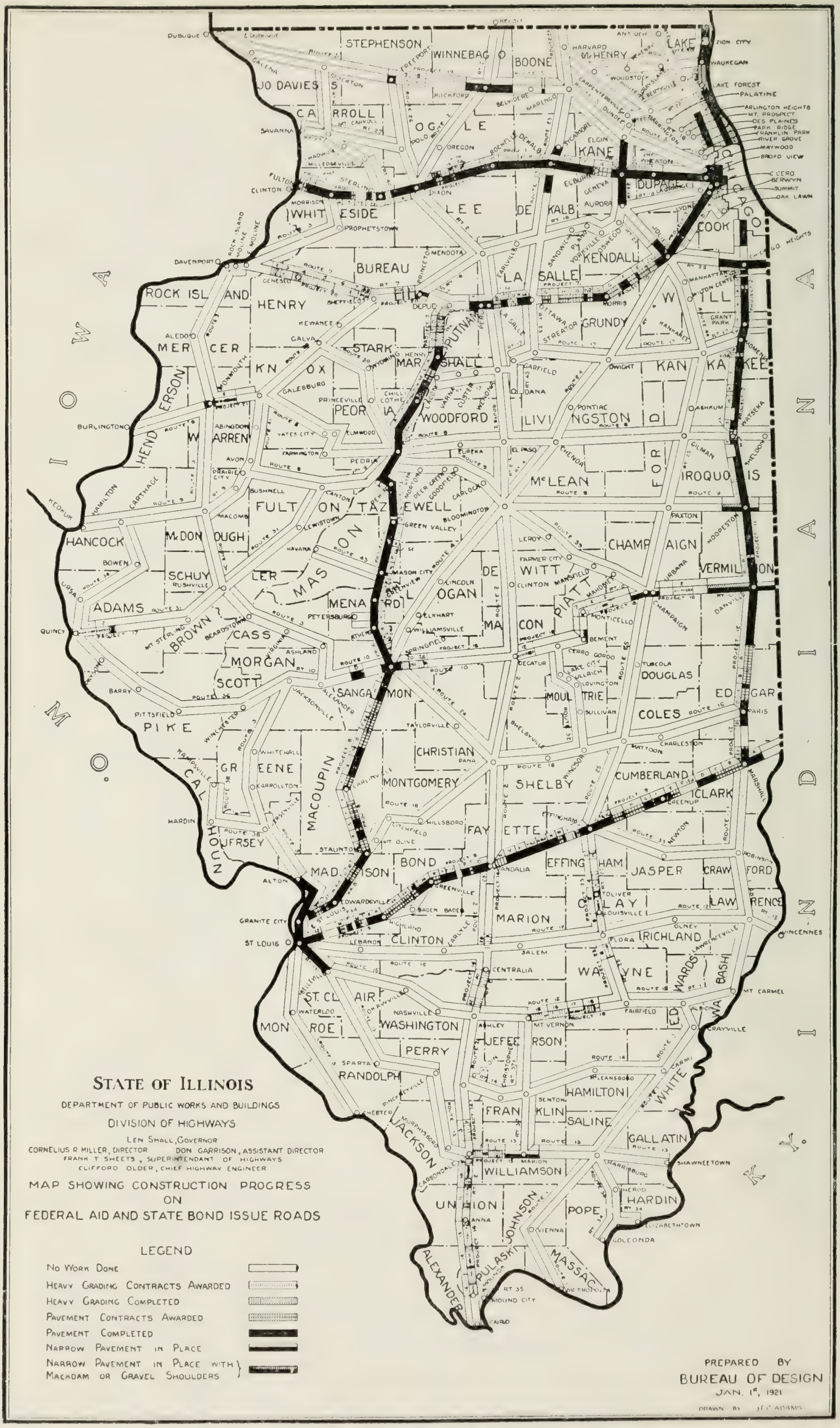

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
DIVISION OF HIGHWAYS
LEN SMALL, GOVERNOR
CORNELIUS R MILLER, DIRECTOR
DON GARRISON, ASSISTANT DIRECTOR
FRANK T SHEETS, SUPERINTENDANT OF HIGHWAYS
CLIFFORD OLDER, CHIEF HIGHWAY ENGINEER
MAP SHOWING CONSTRUCTION PROGRESS ON FEDERAL AID AND STATE BOND ISSUE ROADS
LEGEND
NO WORK DONE
HEAVY GRADING CONTRACTS AWARDED
HEAVY GRADING COMPLETED
PAVEMENT CONTRACTS AWARDED
PAVEMENT COMPLETED
NARROW PAVEMENT IN PLACE
NARROW PAVEMENT IN PLACE WITH MACADAM OR GRAVEL SHOULDERS
PREPARED BY BUREAU OF DESIGN
JAN. 1st, 1921
IOWA
MO.
INDIANA
KY.

Figure 1.—As Illinois looked January 1, 1921.

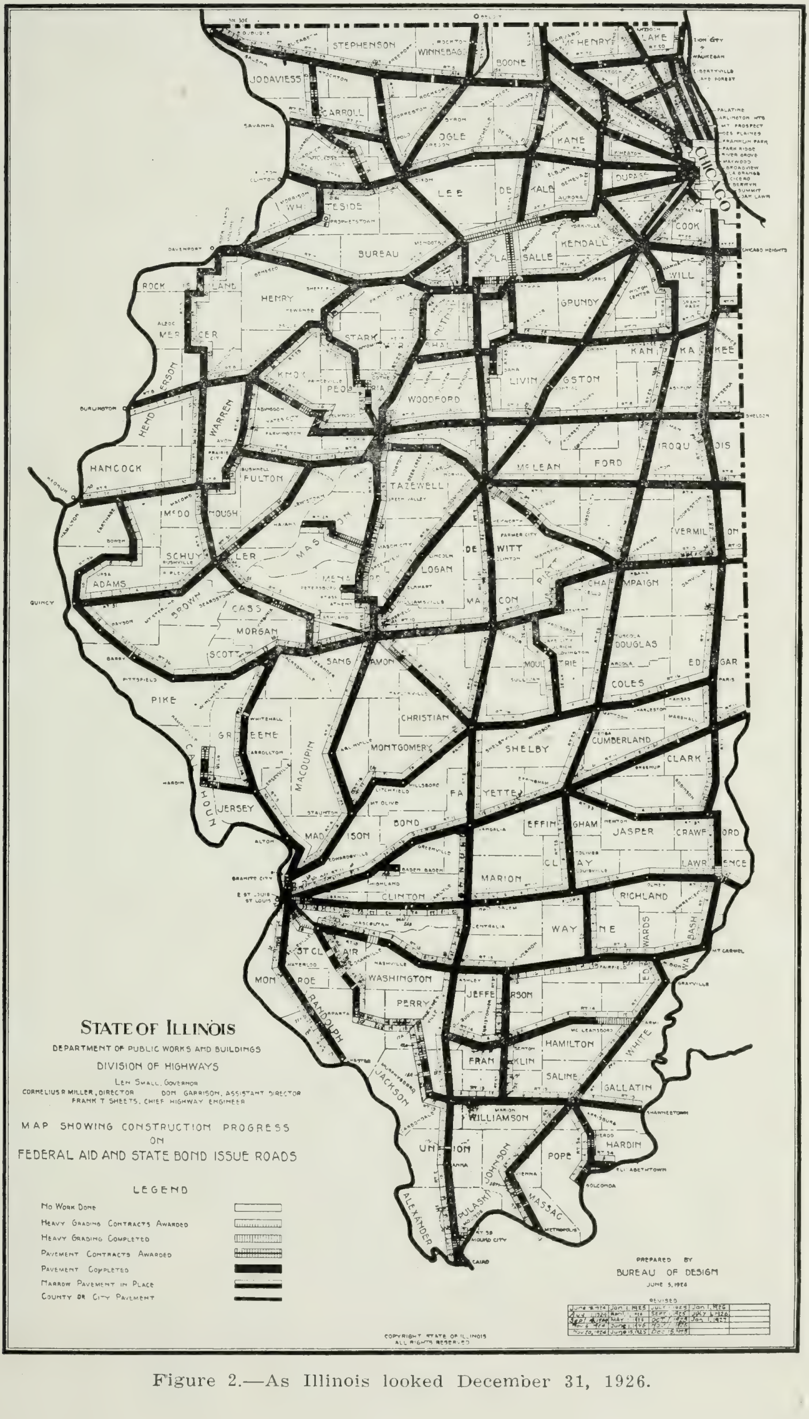


Figure 2.—As Illinois looked December 31, 1926.

Report that it was hoped that these legal matters would be adjusted so that the work on the $100,000,000 system could proceed during 1926, but so much time was consumed in adjusting these legal difficulties that this was impossible. It was necessary to carry several cases to the Supreme Court for decision, which procedure consumed most of the year 1926. In the meantime, all construction on the $100,000,000 system was delayed. These cases, however, have practically all been settled so that it is certain that the new work can proceed during 1927.

A total of 463.74 miles of durable, hard-surfaced roads were completed in 1926, of which 361.79 miles were on the State Bond Issue system. Of this total mileage, 437.39 miles were Portland cement concrete, 6.43 miles brick on a concrete base, 1.22 miles sheet asphalt, 9.71 miles macadam and 8.99 miles gravel. During the season 131 paving mixers were operating and 4,500 men and 850 teams were employed directly in the construction of road and bridge work.

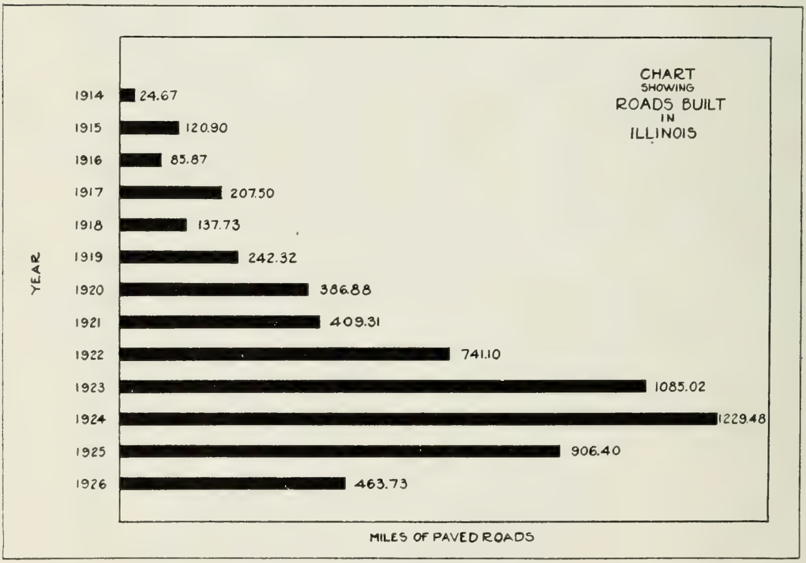


Figure 3.

Another important accomplishment was the adoption of important changes in the marking system. The system now conforms to the regulations officially adopted by the Federal Bureau of Public Roads and the American Association of State Highway Officials for the uniform marking of the principal highways of the United States.

Every effort is made to keep the highways in a neat, presentable and safe condition, and to safeguard our highway investment by thorough and adequate maintenance throughout the entire year. During 1926 there were four snow storms which varied in depth from three to eight inches. To keep the highways open, fifty-four V-type snow plows and four rotary plows were added to the equipment formerly used for this purpose.

The corps of patrol officers created under the provisions of the Motor Vehicle Act has also been very efficient in its work of safeguarding traffic as well as the roads themselves.

5. DETAILED REPORT BY BUREAUS.—A detailed report of the activities of each bureau in the Division for the calendar year 1926 will be found in the following pages. All statistical information is based on calendar years rather than the fiscal year ending July 1st.

II. BUREAU OF DESIGN.

A. Road Section.

1. RECONNOISSANCE SURVEYS.—In 1926, the Department undertook the work of determining the locations of the first of the $100,000,000 Bond Issue roads. The first step in the study of the location is the reconnoissance survey. These surveys are made by competent engineers of the Department, who investigate in the field the relative merits of the various possible locations. Information is obtained with respect to the comparative cost, length, population served, and safety and convenience to traffic on each possible route.

In case the reconnoissance survey shows two or more possible locations which are about equally desirable from an engineering standpoint, or if there is some difference in opinion in the locality to be served by the route in question as to the best location, a public hearing is held at which the local interests are given an opportunity to present the arguments in favor of the location they prefer. The Department then considers the information obtained at the hearing, along with that obtained from the reconnoissance survey, in selecting the final location.

Reconnoissance surveys for approximately 1,100 miles of road on the $100,000.000 Bond Issue System were made in 1926.

2. SURVEYS AND PLANS.—Except in a few cases where changes were made in location, all surveys for the original $60,000,000 Bond Issue System had been completed before 1926, and there was, therefore, very little survey work done on this system during the past year. However, in preparation for early letting of contracts in 1927, detailed surveys and plans were begun on the $100,000.000 Bond Issue System. During 1926, surveys for about 650 miles and plans for approximately 300 miles of this system were completed.

3. CONTRACTS AWARDED.—Table I and Table II show the contracts for road work awarded directly by the State from 1914 to 1926, inclusive, on the State Bond Issue and Federal Aid System and on the State Aid System.

TABLE I—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1918	--------	--------------	----------	------	--------------	8.36	$ 201,619.40	$24,131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401.77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47.57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1,488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5,818.01	83	901,884.69	472.05	12,634,976.84	26,766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23,123,159.60	26,617.20
1924	163.93	2,013,223.70	12,280.99	84	1,070,387.21	503.54	13,597,135.32	27,003.09
1925	143.78	1,330,186.60	9,251.54	135	2,607,739.92	899.20	23,818,244.21	26,488.26
1926	41.25	529,489.19	12,863.10	61.5	2,357,421.08	378.00	10,243,739.05	27,099.84
Total	1,208.93	$12,058,922.53	$9,974.87	859.5	$12,918,209.94	4,274.87	$118,830,803.26	$27,797.52

NOTE.—Grading and bridge work shown does not necessarily coincide with the pavement shown. No Federal Aid or State Bond Issue Contracts were awarded previous to 1918.

TABLE II—STRAIGHT STATE AID CONTRACTS AWARDED.

Year.	Earth roads.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1914	--------	--------------	----------	7	$ 815.00	91.61	$ 963,216.54	$10,514.32
1915	1.75	$ 21,643.58	$12,367.76	308	178,708.65	74.65	738,623.55	9,824.49
1916	186.11	401,613.65	2,157.94	90	62,953.19	97.34	1,212,655.01	12,457.93
1917	181.13	412,056.55	2,274.92	90	77,281.66	90.57	1,333,000.12	14,717.90
1918	--------	--------------	----------	5	44,288.00	2.75	73,708.35	26,803.08
1919	71.10	262,394.20	3,690.50	36	51,588.00	52.08	1,136,820.79	21,830.28
1920	2.76	29,571.32	10,714.25	5	11,890.00	3.48	99,793.61	28,676.32
1921	2.22	9,981.22	4,496.05	19	22,130.33	2.76	46,104.45	16,704.51
1922	.27	3,334.65	12,350.56	5	2,705.00	2.98	49,264.70	16,531.78
Total	445.34	$1,140,595.17	$2,561.18	565	$452,359.83	418.22	$5,653,287.12	$13,517.50

NOTE.—Table shows total cost, one-half of the cost was paid by County and one-half by State. Pavement includes all types and widths.

There have been no appropriations for State Aid Work available since 1922.

Table III shows the amount of work undertaken in accordance with Section 15d of the Road and Bridge Laws, placed under contract in the State as a whole, while Table IV shows the contracts awarded for 15d work by the various counties in 1926.

TABLE III—15D CONTRACTS AWARDED.

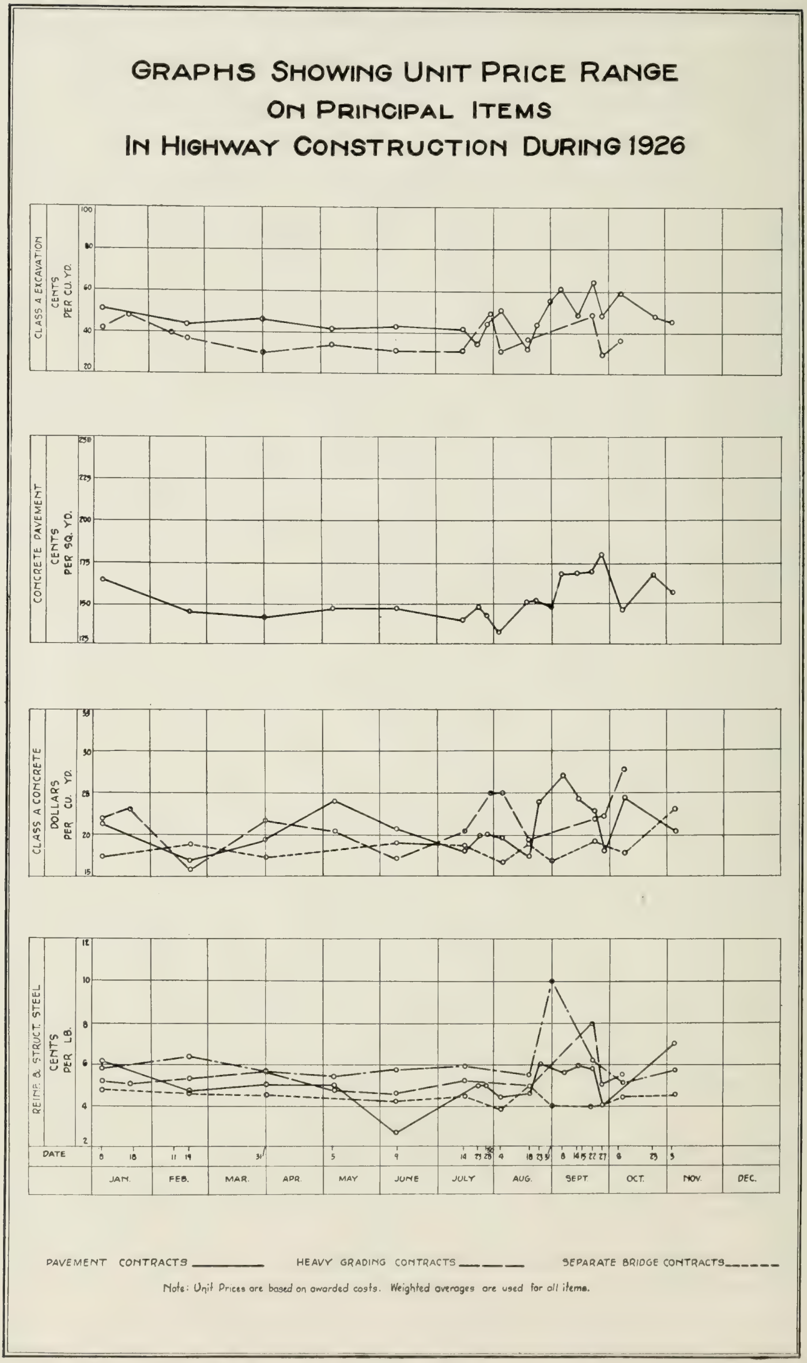
Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1916						174.58	$2,204,680.94	$12,628.49
1917	25.93	$ 60,658.01	$ 2,339.30	16	$ 5,065.00	37.34	745,962.28	19,977.56
1918	11.00	45,609.17	4,146.29	21	44,179.64	10.84	270,480.54	24,952.08
1919	42.58	167,425.56	3,932.02	25	40,680.00	153.94	4,391,177.96	28,525.26
1920	13.07	104,533.72	7,997.98	10	185,494.87	44.06	1,626,373.67	36,912.70
1921	17.57	100,154.52	5,700.31	4	61,746.82	63.84	1,484,506.53	23,253.55
1922	15.23	102,085.56	6,702.92	87	359,743.96	258.34	5,637,805.33	21,823.20
1923	15.32	168,804.06	11,018.54	22	620,366.61	187.41	3,433,764.03	18,322.20
1924	21.38	221,007.97	10,337.14	65	329,099.57	174.15	3,528,734.26	20,262.61
1925	52.36	533,349.06	10,186.19	38	358,394.54	122.48	2,966,340.07	24,218.98
1926	56.24	665,000.82	11,824.34	11	155,400.98	106.56	3,140,570.97	29,472.33
Total	270.68	$2,168,628.45	$8,011.78	299	$2,160,171.99	1,333.54	$29,430,396.58	$22,069.38

TABLE IV—CONTRACTS AWARDED FOR COUNTY 15D WORK—1926.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Carroll					3.019	$ 27,854.21	$ 27,854.21
Cass	1.770	$ 8,461.40					8,461.40
Champaign			1	$ 4,721.23	3.013	53,068.99	57,790.22
Cook	54.030	666,269.93	4	122,204.09	51.785	2,025,063.76	2,813,537.78
Douglas			1	4,450.14			4,450.14
DuPage					0.738	21,014.30	21,014.30
Effingham					0.166	5,002.50	5,002.50
Iroquois			1	3,530.35	5.194	46,703.88	50,234.23
Kane	0.625	10,429.45					10,429.45
Kankakee					0.783	17,589.97	17,589.97
Lake					9.280	248,364.17	248,364.17
Livingston			3	14,158.37			14,158.37
Madison					1.269	35,835.90	35,835.90
Morgan					0.329	7,226.56	7,226.56
Peoria					1.726	44,451.32	44,451.32
Piatt					1.098	15,680.00	15,680.00
Schuyler					3.654	61,727.02	61,727.02
St. Clair	0.590	11,417.50			10.139	325,081.76	336,499.26
Vermilion					0.404	9,661.61	9,661.61
Will					12.661	160,607.87	160,607.87
Winnebago			1	6,336.80	1.298	35,637.15	41,973.95
Total	57.015	$696,578.28	11	$155,400.98	106.556	$3,140,570.97	$3,992,550.23

4. UNIT PRICES.—Figure 4 shows the unit contract prices for the principal items in highway construction during 1926. The dates at the bottom of the chart indicate the date of letting. The various points on the graph are plotted from weighted average unit prices for all work on which Federal aid and State bond issue contracts were awarded.

Figure 5 shows the weighted average unit price by years from 1919 to 1926, inclusive. It will be noted that there was a slight decrease in unit costs for 1926.


GRAPHS SHOWING UNIT PRICE RANGE ON PRINCIPAL ITEMS IN HIGHWAY CONSTRUCTION DURING 1926

Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 4.

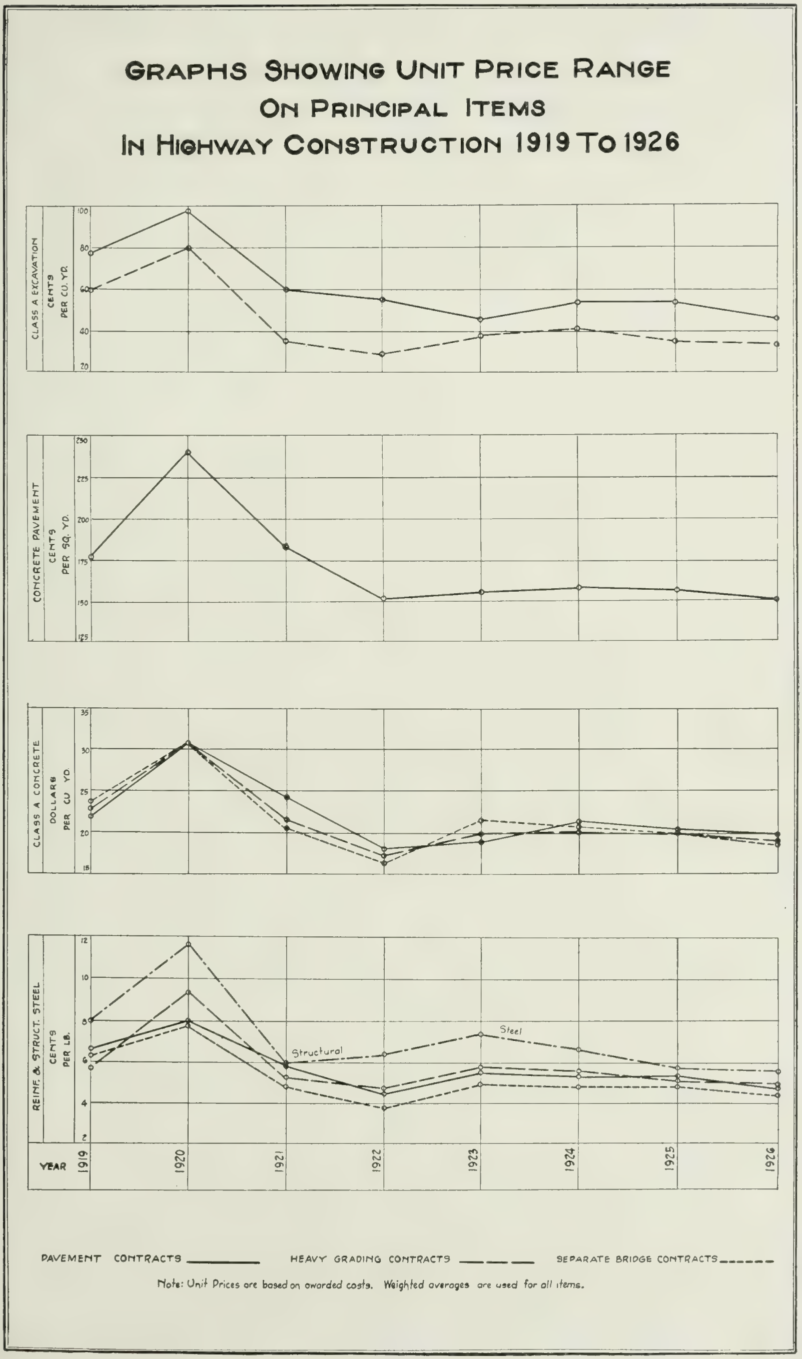

GRAPHS SHOWING UNIT PRICE RANGE
ON PRINCIPAL ITEMS
IN HIGHWAY CONSTRUCTION 1919 TO 1926
CLASS A EXCAVATION
CENTS PER CU. YD.
100
80
60
40
20
CONCRETE PAVEMENT
CENTS PER SQ. YD.
250
225
200
175
150
125
CLASS A CONCRETE
DOLLARS PER CU. YD.
35
30
25
20
15
REINF. & STRUCT. STEEL
CENTS PER LB.
12
10
8
6
4
2
Structural
Steel
YEAR
1919
1920
1921
1922
1923
1924
1925
1926
PAVEMENT CONTRACTS
HEAVY GRADING CONTRACTS
SEPARATE BRIDGE CONTRACTS
Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 5.

5. RESPONSIBILITY OF BIDDERS.—The Department has continued the policy of making a thorough investigation of the qualifications of all low bidders before awarding contracts. Information is secured as to the financial ability, experience, euipment and the organization of the bidder. He is also required to submit a complete working plan and progress chart, outlining his plan of prosecuting the work in question and his estimated progress. If a contract is awarded, it is then possible to compare actual with estimated progress and, in case of any great difference, the contractor is required to take such steps as are necessary to increase his production.

6. CHANGES IN DESIGN.—In 1926, no radical departures were made in design policies. Such changes as were made were more in the nature of refinements and minor improvements of prior practices. Late in 1926 it was decided to increase the width of graded roadway on all $100,000,000 routes from thirty feet to forty feet, and the minimum width of right of way from sixty feet to eighty feet. Width of earth shoulders will be ten or eleven feet, depending on whether pavement is eighteen or twenty feet wide. These shoulders will provide ample space for horse drawn vehicles and tractors, as well as space for parking automobiles for roadside repairs. Also, if any of the pavements require widening in the future, the additional width of pavement can be placed without altering the drainage structures or ditches, and with very little additional grading.

Because of the fact that no contracts had been awarded at the end of 1926 for any of the $100,000,000 Bond Issue roads, this policy will not be effective until 1927.

7. PAVEMENT CROSS SECTIONS.—The thickened edge design of pavement cross section was continued as standard on all work placed under contract in 1926. Figures 6 and 7 show the cross sections in use during 1926. The eighteen-foot standard sections were used on the majority of the work placed under contract. The twenty-foot heavy-traffic section was used near the large centers of population where extremely heavy truck traffic is encountered. The forty-foot width was designed for use on certain highways near Chicago on which traffic is unduly congested. This latter width has been used on only one section, a portion of Route 4 near Chicago, but it will probably be employed on other sections in this locality in following years.

The bituminous concrete and bituminous filled brick pavements are alternates to the Portland cement concrete type. While the figures show these only in the eighteen-foot widths, alternate bids are also invited on these types in the other widths for which Portland cement concrete is shown.

The ten-foot Portland cement concrete, the water bound macadam and the gravel have been used on some county 15d work. The gravel pavement has also been employed on bond issue roads as a temporary surfacing over fills which were considered too deep to pave immediately.

8. REVISIONS IN SPECIFICATIONS.—The following are some of the more important changes made in the specifications during 1926:

a. The use of rail steel for reinforcing in bridges and pavements was permitted.

b. Provision was made for reducing the unit price for pavement where the thickness is deficient.

c. The basis for determining cement overrun was changed, whereby the amount of cement required is determined in accordance with field tests rather than by an empirical formula.

d. The specification for finishing subgrade was changed to reuire that the templet behind the mixer weigh at least 500 pounds.

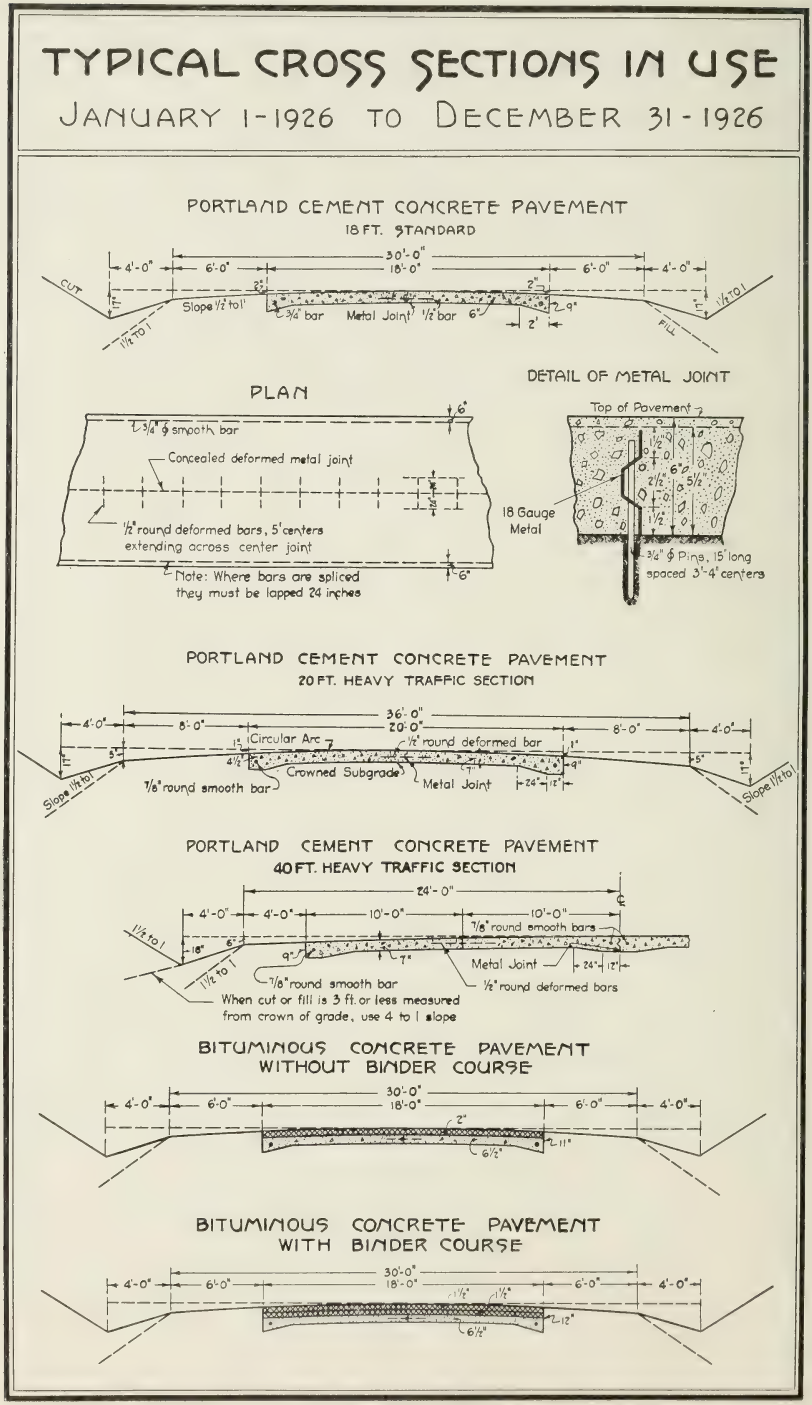
e. Provision was made for the cost of engineering assistance to be borne by the Department rather than by the contractor.

9. FEDERAL AID.—Table V shows all Federal aid allotments which have been made to Illinois.

TABLE V—FEDERAL AID ALLOTMENTS.

Fiscal year ending June 30.	Fund.	Amount allotted to Illinois.	Sub-total.
1917	$ 75,000,000.00	$ 220,926.23	
1918		441,852.46	
1919		658,323.48	
1920		874,220.26	
1921		1,091,266.98	$3,286,589.41
1919	200,000,000.00	$2,185,550.65	
1920		3,278,325.97	
1921		3,273,800.93	8,737,677.55
1922	75,000,000.00	$3,246,281.07	3,246,281.07
1923	50,000,000.00	$2,164,187.38	
1923	Reapportionment	28,611.00	
1924	65,000,000.00	2,797,888.59	
1925	75,000,000.00	3,203,867.99	
1926	75,000,000.00	3,191,479.00	
1927	75,000,000.00	3,154,429.00	14,540,462.96
Total Federal aid allotments to Illinois			$29,811,010.99

The status of Federal funds on January 1, 1927, is shown in Table VI. The table shows the four distinct steps in Federal aid procedure. The first, or project statements stage, is that in which funds are obligated by preliminary statements only, and the amounts are, therefore, only approximate. The second, or project agreement estimate stage, is that in which contract has been awarded and actual unit costs received, but before an agreement has been executed with the Federal Government with respect to the share of the cost it will assume. The project agreement stage is that in which an agreement has been made with the Federal Government as to its share of the cost and construction details. The sum of the amount shown in these three stages is the approximate Federal aid to be received on outstanding projects. The last column of the table, that of completed work stage, shows the total Federal aid already received.



TYPICAL CROSS SECTIONS IN USE

JANUARY 1-1926 TO DECEMBER 31-1926

PORTLAND CEMENT CONCRETE PAVEMENT
18 FT. STANDARD

PLAN

DETAIL OF METAL JOINT

PORTLAND CEMENT CONCRETE PAVEMENT
20 FT. HEAVY TRAFFIC SECTION

PORTLAND CEMENT CONCRETE PAVEMENT
40 FT. HEAVY TRAFFIC SECTION

BITUMINOUS CONCRETE PAVEMENT
WITHOUT BINDER COURSE

BITUMINOUS CONCRETE PAVEMENT
WITH BINDER COURSE

Figure 6.

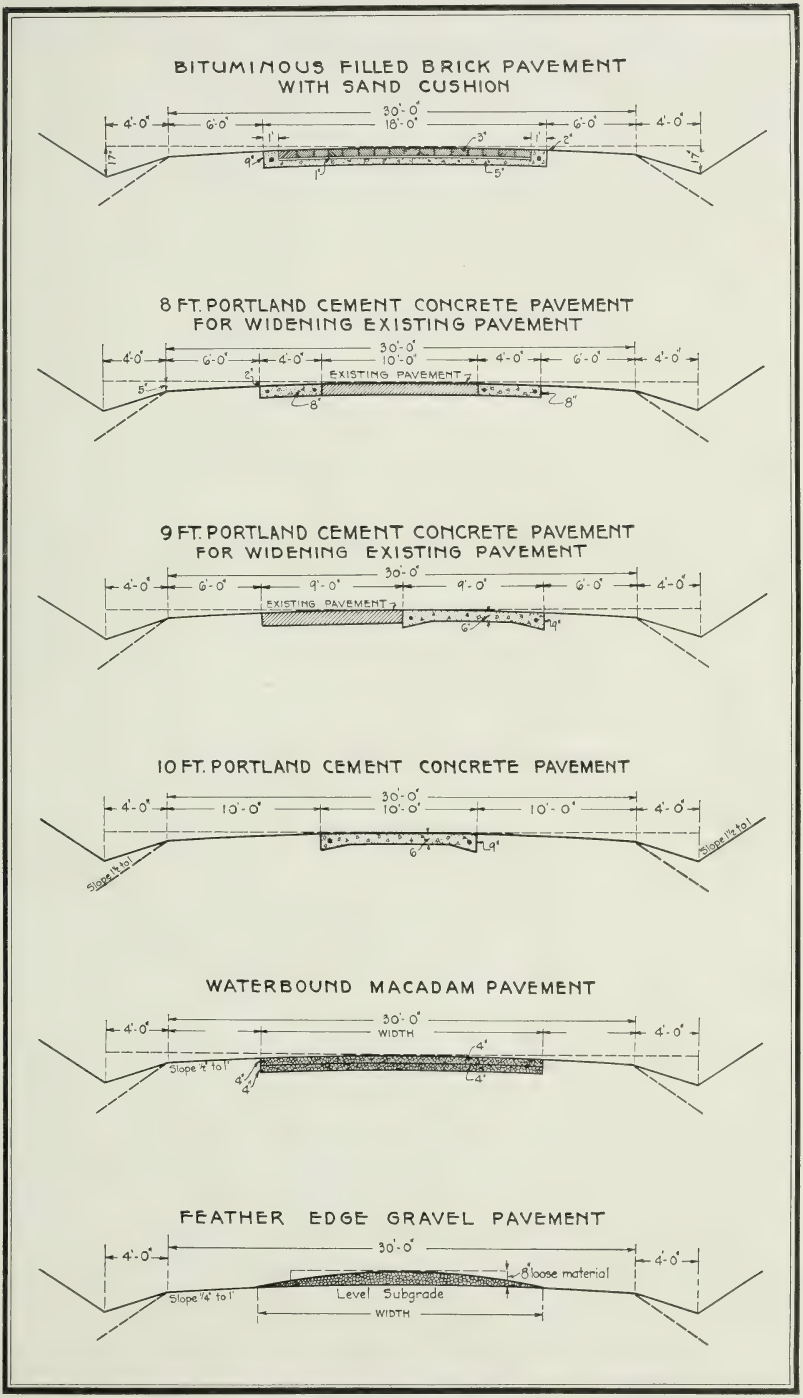

BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION
30'-0"
4'-0"
6'-0"
18'-0"
6'-0"
4'-0"
1'
3"
1'
2"
9"
1"
5"
17"
17"
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
4'-0"
10'-0"
4'-0"
6'-0"
4'-0"
EXISTING PAVEMENT
2"
5"
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
30'-0"
4'-0"
6'-0"
9'-0"
9'-0"
6'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
4'-0"
10'-0"
10'-0"
10'-0"
4'-0"
6"
9"
Slope 1½ to 1
Slope 1½ to 1
WATERBOUND MACADAM PAVEMENT
30'-0"
4'-0"
WIDTH
4'-0"
4"
Slope ¼" to 1'
4"
4"
4"
FEATHER EDGE GRAVEL PAVEMENT
30'-0"
4'-0"
4'-0"
8" loose material
Slope ¼" to 1'
Level Subgrade
WIDTH

Figure 7.

TABLE VI—STATUS OF FEDERAL AID FUNDS—JANUARY 1, 1927.

Project No.	S. B. I. route No.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
1-86		1,385.513					250,934.61	118,458.45	44,204,142.51	20,736,959.56	20,736,959.56
87	3	4.348					5,036.88	3,233.89	137,403.53	61,986.11	61,986.11
88	18	11.113					277,671.41	138,835.70	2,196.00	1,098.00	
89	3	11.165	37,326.84	18,663.42			12,384.61	6,192.30	254,592.13	124,814.55	124,814.55
90	3	7.649					8,066.60	4,033.30	210,286.68	105,143.34	105,143.34
91	31	3.303							128,626.37	49,545.00	49,545.00
92	3	14.363					9,002.56	4,501.28	390,246.75	195,123.37	180,422.38
93	3	19.504					78,043.04	39,021.52	479,484.28	237,452.03	237,452.03
94	22	5.076					5,976.76	2,988.38	148,969.58	74,484.79	74,484.79
95	23	19.735			12,578.80	6,289.40	36,893.61	18,446.80	502,994.92	251,497.45	251,497.45
96	13	23.805					75,379.49	37,689.74	595,612.11	290,356.95	290,356.95
97	9	30.212							844,569.98	422,284.98	392,525.32
98	16	12.859							342,901.07	171,450.53	159,926.77
99	9	19.082					491,254.39	193,601.52	145,712.58	72,856.29	72,856.29
100			No project								
102	24	12.833	105,716.00	52,858.00			260,298.01	130,149.01	50,549.55	25,274.77	
103	1	18.804					246,415.13	123,207.56	232,278.49	116,139.24	112,489.56
104	34	38.570					291,203.91	134,992.28	943,757.39	441,717.40	441,717.40
105	8	18.381					375,680.84	134,601.21	174,501.44	87,250.71	87,250.71
106	39	21.222	136,942.00	68,471.00			109,257.93	54,628.96	312,608.03	156,304.01	43,636.49
107	30	17.979					300,629.17	150,314.59	165,338.66	82,669.82	
108	36	18.030					63,395.09	31,697.54	374,253.01	187,126.50	187,126.50
109	40	39.133					355,561.64	177,336.09	761,953.22	378,669.03	86,310.05
110	13	8.830	161,408.00	80,704.00			165,664.20	79,331.10	15,260.43	7,325.00	
111	36	11.538					292,516.15	146,258.07			
112	31	23.102			204,077.87	102,038.93	150,152.65	74,700.26	320,209.66	147,089.19	63,217.96
113	11	7.477					30,148.60	15,074.30	146,050.58	73,025.29	73,025.29
114	38	8.907	88,062.00	44,031.00	213,471.11	106,735.55					
115	13	13.637	48,334.00	24,167.00			388,563.29	194,049.91	51,003.42	25,465.73	
116	78	10.5	336,550.00	168,275.00							
117	59	4.6	160,600.00	80,300.00							
118	154	7.6	212,400.00	106,200.00							
119	163	3.8	56,500.00	28,250.00							
120	91	11.5	419,000.00	209,500.00							
121	86	12.6	388,600.00	194,300.00							
122	78	16.5	693,200.00	346,600.00							
123	172	4.96	164,480.00	82,240.00							
124	122	8.3	266,500.00	133,250.00							
125	140	1.5	45,000.00	22,500.00							

126	88	11.3	376,500.00	188,250.00							
127	151	7.75	274,500.00	137,250.00							
128	96	7.25	301,000.00	150,500.00							
129	80	14.4	492,500.00	246,250.00							
130	74	15.0	723,000.00	361,500.00							
131	121	6.5	266,800.00	133,400.00							
132	63	8.5	375,000.00	187,500.00							
133	125	8.0	237,700.00	118,850.00							
134	99	5.8	175,000.00	87,500.00							
135	121	28.0	919,200.00	459,600.00							
136	89	28.5	916,900.00	458,450.00							
137	98	22.0	660,000.00	330,000.00							
138	150	7.1	213,000.00	106,500.00							
139	49	33.5	1,072,000.00	536,000.00							
140	51	26.5	1,209,000.00	604,500.00							
141	50	11.8	625,000.00	312,500.00							
142	70	30.0	855,700.00	427,850.00							
143	83	55.5	1,762,000.00	881,000.00							
144	85	3.6	112,000.00	56,000.00							
145	95	9.5	309,000.00	154,500.00							
146			No project								
147	157	19.0	666,000.00	330,000.00							
148	152	19.5	591,000.00	295,500.00							
149	162	12.15	381,000.00	190,500.00							
	Total	2,299.180	16,834,418.84	8,417,209.42	430,127.78	215,063.88	4,190,130.57	2,013,343.76	51,935,502.37	24,523,109.14	23,837,744.50

10. STATE AID.—The State Aid System is composed of the secondary roads of the State. The Road and Bridge Laws provide that the State aid roads which have not been taken over by the Department of Public Works and Buildings shall be under the jurisdiction of the various counties.

Table VII shows the mileage of State aid roads in the various counties, as of January 1, 1927.

TABLE VII—STATUS OF STATE AID MILEAGE.

County.	Class.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
Adams	2	1,538.00	384.50	366.00	18.50
Alexander	1	427.00	85.40	60.55	24.85
Bond	1	655.00	131.00	118.14	12.86
Boone	1	492.00	98.40	91.40	7.00
Brown	1	513.00	102.60	79.80	22.80
Bureau	2	1,481.00	370.25	299.10	71.15
Calhoun	1	317.80	63.56	58.80	4.76
Carroll	1	748.00	149.60	118.35	31.25
Cass	1	570.00	114.00	108.50	5.50
Champaign	2	1,910.00	477.50	381.13	96.37
Christian	2	1,269.00	317.25	260.30	56.95
Clark	1	994.00	198.80	189.45	9.35
Clay	1	842.00	168.40	144.05	24.35
Clinton	1	704.00	140.80	100.10	40.70
Coles	2	968.00	242.00	184.85	57.15
Cook	3	1,614.00	484.00	471.90	12.10
Crawford	1	821.00	164.20	118.20	46.00
Cumberland	1	687.00	137.40	93.25	44.15
DeKalb	2	1,089.00	272.25	242.23	30.02
DeWitt	1	732.00	146.40	116.25	30.15
Douglas	1	790.00	158.00	101.65	56.35
DuPage	2	776.00	194.00	179.20	14.80
Edgar	2	1,105.00	276.25	266.53	9.72
Edwards	1	414.00	82.80	67.60	15.20
Effingham	1	956.00	191.20	146.30	44.90
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	130.60	39.00
Franklin	1	648.00	129.60	123.45	6.15
Fulton	2	1,488.00	372.00	360.25	11.75
Gallatin	1	440.00	88.00	74.00	14.00
Greene	1	805.00	161.00	159.35	1.65
Grundy	1	756.75	151.35	147.60	3.75
Hamilton	1	817.00	163.40	142.80	20.60
Hancock	2	1,452.00	363.00	241.55	121.45
Hardin	1	245.00	49.00	37.50	11.50
Henderson	1	595.00	119.00	101.40	17.60
Henry	2	1,401.00	350.25	285.80	64.45
Iroquois	2	2,108.00	527.00	416.60	110.40
Jackson	2	977.00	244.25	185.75	58.50
Jasper	1	960.00	192.00	161.70	30.30
Jefferson	2	1,100.00	275.00	230.20	44.80
Jersey	1	572.00	114.40	84.20	30.20
JoDaviess	2	883.00	220.75	168.90	51.85
Johnson	1	432.00	86.40	88.80	----------------
Kane	2	836.00	209.00	208.95	0.05
Kankakee	2	1,300.00	325.00	239.62	85.38
Kendall	1	508.00	101.60	98.10	3.50
Knox	2	1,308.85	327.21	327.72	----------------
Lake	2	850.70	212.68	200.34	12.34
LaSalle	2	2,006.00	501.50	382.03	119.47
Lawrence	1	662.00	132.40	120.35	12.05
Lee	2	1,229.00	307.25	307.88	----------------
Livingston	2	2,029.00	507.25	363.25	144.00
Logan	2	957.00	239.25	192.35	46.90
McDonough	2	1,094.00	273.50	275.60	----------------
McHenry	2	993.00	248.25	239.25	9.00
McLean	2	2,080.00	520.00	303.05	216.95
Macon	2	1,027.00	256.75	216.95	39.80
Macoupin	2	1,427.00	356.75	295.17	61.58
Madison	2	1,169.00	292.25	227.85	64.40
Marion	2	1,138.00	284.50	238.30	46.20

TABLE VII—Concluded.

County.	Class.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
Marshall	1	618.00	123.60	121.02	2.58
Mason	1	798.00	159.60	114.45	45.15
Massac	1	368.00	73.60	59.05	14.55
Menard	1	506.00	101.20	95.45	5.75
Mercer	1	911.00	182.20	142.50	39.70
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1,258.00	314.50	252.10	62.40
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	97.20	26.40
Ogle	2	1,330.00	332.50	332.20	0.30
Peoria	2	1,099.75	274.93	255.35	19.58
Perry	1	706.00	141.20	128.15	13.05
Piatt	1	764.00	152.80	144.90	7.90
Pike	2	1,542.00	385.50	285.75	99.75
Pope	1	559.30	111.86	106.05	5.81
Pulaski	1	334.50	66.90	56.35	10.55
Putnam	1	270.00	54.00	45.45	8.55
Randolph	2	886.00	221.50	154.00	67.50
Richland	1	809.00	161.80	120.90	40.90
Rock Island	2	688.00	172.00	161.80	10.20
St. Clair	2	1,279.00	319.75	189.15	130.60
Saline	1	609.00	121.80	90.80	31.00
Sangamon	2	1,401.00	350.25	237.95	112.30
Schuyler	1	840.00	168.00	161.70	6.30
Scott	1	363.00	72.60	73.30	--------
Shelby	2	1,495.00	373.75	290.10	83.65
Stark	1	531.00	106.20	112.05	--------
Stephenson	2	1,077.00	269.25	226.30	42.95
Tazewell	2	1,010.00	252.50	213.50	39.00
Union	1	626.00	125.20	120.80	4.40
Vermilion	2	1,558.00	389.50	329.30	60.20
Wabash	1	380.00	76.00	70.50	5.50
Warren	1	990.00	198.00	135.70	62.30
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	231.70	44.50
White	2	992.00	248.00	181.56	66.44
Whiteside	2	1,130.00	282.50	257.75	24.75
Will	2	1,611.00	402.75	347.75	55.00
Williamson	2	827.00	206.75	152.90	53.85
Winnebago	2	1,025.53	256.38	252.05	4.33
Woodford	1	941.00	188.20	165.35	22.85
Total	--------	97,287.18	22,688.27	18,913.82	3,786.84

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

Class.	Number of counties.	Total road mileage.	Permissable State aid mileage.	Designated State aid mileage.	Permissable mileage not designated.
1	52	34,280.35	6,856.07	5,808.41	1,056.81
2	49	61,392.83	15,348.20	12,633.51	2,717.93
3	1	1,614.00	484.00	471.90	12.10
Total	102	97,287.18	22,688.27	18,913.82	3,786.84

11. HOUSE BILL 433.—Under the provisions of the $60,000,000 Bond Issue Act, the State has only been permitted to extend pavements through cities and villages of less than 2,500 population. It was found, however, that there were towns of greater population which could not afford to build pavements to connect with the State highways at the corporate limits. As a result, a number of gaps occurred

in otherwise completed routes, to the great inconvenience of the traveling public.

To remedy this condition, the Fifty-fourth General Assembly passed an act, designated as House Bill 433, and carrying an appropriation of $1,000,000 to permit the State to extend otherwise completed bond issue roads through municipalities of more than 2,500 population. This legislation has enabled the Department to close a number of gaps which previously had been a source of constant annoyance to highway users.

A list of contracts which have been awarded under the provisions of this bill is shown in Table VIII.

TABLE VIII—CONTRACTS AWARDED UNDER HOUSE BILL 433.

City	Route.	Length in miles.	Contract cost cement.
Abingdon	41	1.290	$52,528.83
Anna	2	1.103	34,573.85
*Bushnell	9	0.757	22,704.79
Charleston	16	0.226	5,179.92
Danville	10	0.058	1,817.24
Flora	25	0.306	8,992.90
Freeport	5	0.368	10,303.48
Galena	5	0.689	31,309.81
Galva	28	1.130	29,024.42
Geneseo	7	0.986	23,861.87
Harrisburg	1	0.393	14,221.25
Highland	11	0.765	20,904.05
*Jerseyville	3 and 38	1.523	37,803.13
Lawrenceville	1	1.020	23,001.73
*Litchfield	16	0.696	19,752.10
Marseilles	7	1.965	54,895.23
Mattoon	25	0.125	3,396.14
Mendota	2 and 18	1.005	27,798.68
Metropolis	1	1.056	29,008.43
Mt. Carroll	40	0.447	11,522.33
*Mt. Olive	16	1.780	47,621.55
Ottawa	7	0.862	23,118.90
Pana	24	0.723	18,979.73
Pontiac	4	0.863	24,035.82
Robinson	1	0.202	10,088.90
Roodhouse	3	1.313	33,356.01
Shelbyville	16	0.433	11,425.83
Staunton	4 and 16	1.632	51,063.56
*Sullivan	32	0.042	1,187.10
*Sycamore	23	0.099	4,160.69
Vandalia	11	0.936	27,075.60
Virden	4	1.649	45,517.39
West Frankfort	37	0.363	12,922.21
Whitehall	3	1.321	34,289.78
Total		28.088	$807,443.25

* Contracts awarded in 1925.

12. HOUSE BILL 536.—The Fifty-fourth General Assembly also made an appropriation of $300,000 to refund cities and villages of less than 7,500 population for pavements built by them since January 1, 1921, to complete State bond issue roads within the corporate limits. This bill carried a number of conditions which must have been met before a refund could be made. In each case where a claim for refund was filed, a careful check had to be made to insure that the pavement in question complied with all requirements of the bill. The Bureaus of Design, Construction, and Materials made the necessary investigations.

While no refunds were made in 1926, practically all investigations were completed, and payment will be made to those cities and villages entitled to receive payment.

13. REFUNDS TO COUNTIES.—The $60,000,000 Bond Issue Act provides that, wherever there is incorporated in the system previously constructed pavement built at the entire or partial expense of a county, such county shall be refunded for its share of the cost of such pavement. The Bureau of Design supervises the investigation of claims for refund, and keeps a record of the status of funds due each county.

Tables showing the status of refund appropriations will be found in the report of the Bureau of Audits.

14. GRADE SEPARATIONS.—During 1926 the Department continued its efforts to eliminate dangerous railroad grade crossings on the bond issue system. Wherever possible, highways are relocated to avoid crossing railroads. Often this is not possible, and an effort is then made to separate grades between the highway and railway. In such cases, it is necessary to obtain an order from the Illinois Commerce Commission, which has jurisdiction of all railroad crossings, for the separation. The policy of the Department is to attempt to reach an agreement with the railroad company involved, with reference to the physical details of the proposed separation and the division of cost between the company and the Department, before presenting the matter to the Commission.

There have been completed on the $60,000,000 Bond Issue System, sixty-one grade separations, exclusive of those existing when the roads were constructed, and utilized in place. Of this number, twenty-two were completed in 1926. Orders were also secured from the Commerce Commission in 1926 for ten additional separations, the construction of which was not completed at the end of the year.

Table IX shows the grade separation cases settled since work was begun on the bond issue system. In addition to these, negotiations are under way for a number of others for which settlements will probably be reached in 1927.

15. SPECIAL REPORTS, MAPS, ETC.—The activities of the Bureau of Design also include the preparation of various maps, reports, and similar matter. The preparation of this information involves a large amount of drafting and clerical work, and is an important function of the Division of Highways.

B. Bridge Section.

1. ACTIVITIES.—The work of the Bridge Section of the Bureau of Design includes the preparation of plans for all bridges on State Bond Issue highways; the preparation of plans, when requested by county superintendents of highways, for bridges on county and township highways; the approval of plans prepared by county superintendents of highways; the investigation of old bridges to determine safety; the approval of shop drawings and shop inspection of fabricated steel for steel bridges; the preparation of specifications governing the design and

TABLE IX—GRADE SEPARATION CASES SETTLED.

(January 1, 1919 to January 1, 1927.)

Location.				Railroad.	I. C. C. case number.	Type of crossing.	Petition filed.	Final hearing.	I. C. C. order issued.	Year completed.
Rt.	Sec.	County.	Near.							
1	11	Will	Steger	C. & E. I	9264	Under	July 9, 1919	May 10, 1922	May 25, 1922	1923
1	F-1	Clark	Marshall	Penn	10702	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
1	F	Clark	Marshall	C., C., C. & St. L	11076	Under	Oct. 28, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
1	161	Cook	Harvey	I. C		Under				1925
1	161	Cook	Homewood	I. C	13375	Over	June 25, 1923	July 19, 1923	Oct. 17, 1923	1924
1	35	Johnson	Ozark	I. C	12858	Under	Dec. 11, 1922	Apr. 9, 1925	May 20, 1925	1925
1	38-V	Johnson	Vienna	C., C., C. & St. L	14353	Over	Aug. 7, 1924	Sept. 10, 1925	Oct. 20, 1925	1926
1	37-V	Johnson	Bloomfield	C., C., C. & St. L	12859	Over	Dec. 11, 1922	Feb. 5, 1925	May 13, 1925	1925
1	K-V	Cook	Riverdale	I. H. B	15962	Over	Jan. 5, 1926	Feb. 9, 1926	Feb. 24, 1926	*
1	33	Saline	Stonefort	S. I. & K	14506	Under	Oct. 11, 1924	Oct. 23, 1924	Jan. 15, 1925	1926
2	14	Pulaski	Ullin	C. & E. I	12634	Under	Sept. 5, 1922	May 1, 1923	June 21, 1923	1923
2	3	Jackson	DeSoto	M. P	12636	Under	Sept. 5, 1922	Feb. 6, 1923	Apr. 18, 1923	1923
2	48	Macon	Decatur	I. C	13380	Under	June 26, 1923	May 22, 1924	June 4, 1924	1924
2	3	Jackson	Wards Mine	I. C	10742	Over	June 26, 1920	May 20, 1925	June 3, 1925	1926
2	11-B	Union	Cobden	I. C	10741	Over	June 26, 1920	Mar. 4, 1926	Mar. 10, 1926	*
2	51-S	Macon	Maroa	Penn	13676	Under	Nov. 15, 1923	July 20, 1926	July 29, 1926	*
2	70-V	LaSalle	Oglesby	I. C	15749	Over	Oct. 24, 1925	Dec. 18, 1925	Mar. 17, 1926	1926
2	73-V	Lee	Henkel	I. C	16011	Over	Jan. 20, 1926	Mar. 24, 1926	Apr. 28, 1926	*
3	67	Monroe	Columbia	M. & O	12637	Under	Sept. 5, 1922	Mar. 22, 1923	May 8, 1923	1923
3	59	Jersey	McCluskey	C., P. & St. L	13847	Under	Jan. 30, 1924	May 8, 1924	May 14, 1924	1924
3	7	Rock Island	Silvis	D., R. I. & N. W	14412	Under	Sept. 6, 1924	Mar. 5, 1925	Apr. 23, 1925	1925
3	73-S	Randolph	Evansville	M.-I	14665	Under	Dec. 19, 1924	Mar. 4, 1925	May 13, 1925	1926
3	28	Warren-Mercer	Alexis Jc	R. I. SN	15436	Under	July 28, 1925	Nov. 3, 1925	Nov. 24, 1925	1925
3	33-S	Warren	Monmouth	C., B. & Q	15926	Under	Dec. 18, 1925	Mar. 4, 1926	Mar. 23, 1926	1926
4	M	Will	Joliet	E., J. & E	13923	Under	Feb. 26, 1924	Apr. 16, 1924	May 14, 1924	1924
4	F-1	Madison	Center Grove Park	I. T., Inc	15054	Over	Apr. 17, 1925	July 24, 1925	Nov. 3, 1925	*
5	7	Cook	Spaulding	E., J. & E	12635	Over	Sept. 5, 1922	Oct. 25, 1922	Dec. 6, 1922	1925
5	25	JoDaviess	Wood Bine	C. G. W	14359	Over	Aug. 11, 1924	Jan. 6, 1926	Feb. 3, 1926	1926
5	3	Cook	Elmhurst	C. & N. W	15975	Under	Jan. 8, 1926	June 14, 1926	June 23, 1926	*
6	2	DuPage	West Chicago	E., J. & E	10887	Under	Aug. 13, 1920	Apr. 16, 1924	May 14, 1924	1924
7	9	Bureau	Langley	C. & N. W	11705	Under	June 6, 1921	July 27, 1921	July 28, 1921	1923
7	R	Bureau	DePue	N. Y. C	13666	Under	Nov. 13, 1923	July 31, 1924	Sept. 10, 1924	1925
7	S	Bureau	Spring Valley	C. & N. W	14959	Over	Mar. 16, 1925	July 17, 1925	July 29, 1925	1925
8	8	Henderson	East Burlington	C., B. & Q	14492	Under	Oct. 7, 1924	Nov. 2, 1925	Nov. 24, 1925	1926
8	40-V	Knox	Galesburg	C., B. & Q	15214	Over	June 1, 1925	July 12, 1926	July 29, 1926	1926
8	46-S	Knox	Yates City	C., B. & Q	16450	Under	June 22, 1926	July 8, 1926	July 29, 1926	*
10	24	Morgan	Arnold	Wabash	11857	Under	Aug. 27, 1921	Nov. 23, 1922	Dec. 15, 1922	1923
10	21	Sangamon	Curran	C. & N. W	12460	Under	June 6, 1922	Oct. 18, 1922	Dec. 6, 1922	1923
10	19-X	Sangamon	Riverton	I. T., Inc	13511	Under	Sept. 8, 1923	Oct. 4, 1923	Oct. 24, 1923	1925

11	29-S	St. Clair	East St. Louis	B. & O., Penn	10291	Under	Mar. 1, 1920	June 29, 1921	Mar. 28, 1922	1925
11	39	Madison	St. Jacobs	Penn	10705	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
11	Y	Fayette	Mulberry Grove	Penn	10704	Over	June 15, 1920	Nov. 3, 1921	Nov. 9, 1921	1922
11	L	Effingham	Effingham	Penn	10703	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
11	42-S	Madison	Highland	Penn	16039	Under	Feb. 1, 1926	Feb. 19, 1926	Mar. 2, 1926	*
12	17-V	Marion	Odin	I. C	12663	Over	Sept. 16, 1922	Sept. 8, 1925	Sept. 17, 1925	1926
12	31-V	St. Clair	O'Fallon	B. & O	16331	Over	May 11, 1926	July 6, 1926	July 21, 1926	*
12	13	Clay	Greendale	S. I. & K	13635	Over	Oct. 30, 1923	Nov. 13, 1923	Nov. 15, 1923	1926
13	13-S	Jackson	Murphysboro	M. P	15440	Under	July 28, 1925	Apr. 21, 1926	June 9, 1926	1926
13	7	Williamson	Crab Orchard	S. I. & K	14505	Under	Oct. 11, 1924	Oct. 23, 1924	Jan. 15, 1925	1926
14	9	Hamilton	McLeansboro	L. & N	12895	Under	Dec. 28, 1922	Oct. 23, 1923	Nov. 7, 1923	1925
14	4	Franklin	Christopher	C., B. & Q	12857	Under	Dec. 11, 1922	May 7, 1924	July 9, 1924	1924
14	7	Franklin	Macedonia	S. I. & K	13585	Under	Oct. 9, 1923	Oct. 23, 1923	Oct. 23, 1923	1925
15	16	Jefferson	Bluford	S. I. & K	13638	Over	Oct. 30, 1923	Nov. 13, 1923	Nov. 15, 1923	1925
17	28-V	Livingston	Blackstone	N. Y. C	16293	Over	Apr. 26, 1926	Oct. 7, 1926	Oct. 27, 1926	*
18	12-V	Kendall	Montgomery	C., B. & Q	15350	Over	July 13, 1925	Oct. 12, 1925	Oct. 21, 1925	1926
19	86	Cook	DesPlaines	C. & N. W., Soo	12421	Under	July 11, 1922	Nov. 28, 1922	Apr. 25, 1923	*
22	42-A	Cook	Matteson	I. C	12060	Under	Dec. 6, 1921	Jan. 24, 1922	Jan. 25, 1922	1924
22	13-D	Will	Joliet	E., J. & E	14909	Over	Mar. 2, 1925	Mar. 13, 1925	Mar. 18, 1925	1925
22	13-S	Will	Joliet	C., R. I. & P	15246	Under	June 13, 1925	Mar. 3, 1926	Apr. 21, 1926	1926
23	26-V	DeKalb	Genoa	I. C	15130	Over	May 22, 1925	July 17, 1925	July 29, 1925	1926
25	22-V	Douglas	Tuscola	C., I. & W., C. & E. I., I. C	13845	Over	Jan. 30, 1924	May 6, 1924	May 20, 1925	*
26	1	Stephenson	South Freeport	C. G. W	13590	Under	Oct. 8, 1923	Oct. 18, 1923	Nov. 21, 1923	1923
26	4-V	Ogle	Polo	C., B. & Q	14664	Over	Dec. 19, 1924	June 10, 1926	June 24, 1926	*
28	6	Knox	Wataga	C., B. & Q	13297	Under	May 31, 1923	May 7, 1924	July 9, 1924	1924
28	11	Henry	Kewanee	C., B. & Q	13237	Under	May 11, 1923	May 7, 1924	July 9, 1924	1924
29	M-2	Peoria	Chillicothe	A., T. & S. F	9477	Under	Sept. 10, 1919		Apr. 28, 1920	1921
31	3	Adams	Paloma	C., B. & Q	12459	Under	June 6, 1922	Mar. 6, 1923	Apr. 11, 1923	1924
31	16-V	Fulton	Astoria	C., B. & Q	16333	Over	May 12, 1926	July 8, 1926	Sept. 15, 1926	1926
32	4	Moultrie	Lovington	Penn	15212	Under	June 1, 1925	Dec. 3, 1925	Dec. 15, 1925	1926
36	19-S	Pike	Barry	Wabash	15104	Under	May 2, 1925	July 20, 1926	July 29, 1926	1926
37	11	Franklin	West Frankfort	I. C	14086	Under	May 6, 1924	May 21, 1924	June 4, 1924	1926
37	13	Williamson	Johnston City	I. C	12639	Over	Sept. 6, 1922	Oct. 4, 1923	Dec. 11, 1923	1924
41	14	Knox	Galesburg	R. I. SN	15706	Under	Oct. 14, 1925	Nov. 4, 1925	Dec. 1, 1925	1926
44	15	Kankakee	Bradley	I. C., N. Y. C	13591	Under	Oct. 8, 1923	June 6, 1924	Sept. 10, 1924	1926

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* Work not completed.

construction of all highway bridges within the State; and rendering consulting engineering services to county superintendents of highways on all phases of bridge design and construction.

2. PLANS PREPARED.—The total plans for major structures constructed independent of pavement work, prepared each year from 1906 to 1926, is shown in Table X. For the past seven years, during which State Bond Issue work has been prosecuted vigorously, an average of 390 plans have been prepared each year for work estimated to cost more than $3,000,000. With an average of twenty-four engineers engaged in this work, the large output is made possible by the use of standard designs wherever conditions will permit.

TABLE X—PLANS PREPARED AND CONTRACTS AWARDED FROM 1906 TO 1926.

Year.	Plans prepared.	Estimated cost.	Contracts let.	Contract price.
1906	15		11	$ 37,035.00
1907	113		48	41,519.00
1908	149		64	165,674.00
1909	122		92	133,285.00
1910	203		141	148,432.00
1911	241		127	238,903.00
1912	214		150	212,694.00
1913	238	$ 342,052.00	139	200,834.00
1914	269	470,363.00	109	184,792.00
1915	707	984,420.00	565	541,509.00
1916	735	1,169,743.00	439	566,657.00
1917	480	812,614.00	502	582,993.00
1918	206	499,702.00	169	277,130.00
1919	231	761,458.68	202	514,897.00
1920	443	2,841,896.22	301	2,208,494.84
1921	384	2,134,476.49	337	1,909,455.67
1922	374	2,365,726.45	317	1,775,066.00
1923	484	3,359,109.03	413	3,170,269.46
1924	420	4,220,819.17	258	1,594,035.90
1925	340	2,972,560.80	283	2,940,774.86
1926	281	3,782,267.84	164	2,702,055.34
Total	6,649	$26,717,208.68	4,831	$20,146,506.07

The building of bridges over the larger streams and rivers throughout the State is becoming an important phase of highway construction. A brief description of some of the bridges for which plans were prepared in 1926 will indicate the magnitude of this work:

Wabash River Bridge at Vincennes.—Steel spans, four at 200 feet each. Concrete spans, four at fifty-five feet each, three at forty-four feet each, one at thirty-three feet and two at fifteen feet each. Roadway twenty-two feet with two five-foot sidewalks. Provides a grade separation with railroad tracks on Indiana shore. Estimated cost $333,900.00.

Rock River Bridge at Prophetstown.—Reinforced concrete deck girders, twelve spans at sixty feet each. Roadway twenty-two feet. Estimated cost $102,000.00.

Fox River Bridge at Yorkville.—Reinforced concrete arches, six spans at seventy feet each. Roadway twenty-two feet, and two five-foot sidewalks. Contract awarded 1926 for $85,700.00.

Illinois River Bridge at Florence.—Eight steel spans at 215 feet each, and a vertical lift span over the channel to provide a horizontal clearance of 206 feet between fender piers, and a vertical clearance of sixty-five feet above high water. Roadway twenty-four feet. Contract awarded 1926 for $530,640.00. At the present time all traffic across the river must use a ferry. The completion of the bridge will save much time and inconvenience to all who travel Bond Issue Route 36.

Sangamon River Bridge at Petersburg.—All steel spans with reinforced concrete floors, three spans at 200 feet and two spans at 100 feet. Roadway twenty-two feet with one five-foot sidewalk. Contract awarded 1926 for $125,900.00.

Grade Separation Structure at Riverdale.—Steel spans, two at ninety-six feet six inches and one at fifty-six feet six inches. Concrete spans, two at forty-six feet nine inches and fourteen at forty-seven feet. Roadway forty-four feet and two five-foot sidewalks. Contract warded 1926 for $250,200.00.

Fox River Bridge at McHenry.—Reinforced concrete deck girders, eight spans at fifty-two feet. Roadway thirty feet with two five-foot sidewalks. Contract awarded 1926 for $93,800.00.

Plans were also prepared in 1926 for 3,669 small bridges and culverts, estimated to cost $1 022,440.20, and to be included in road contracts. This work added to that given in the table for 1926 gives a total for the year of 3,950 plans prepared for work estimated to cost $4,804,708.04.

3. CONTRACTS AWARDED.—A summary of contracts awarded by years is also given in Table X. Several of the most notable projects for which contracts were awarded in 1926 are described above. Another project well worthy of mention is the bridge across the Illinois River at LaSalle on Bond Issue Route 2. This bridge consists of seven steel spans of 200 feet each, and a channel span of 260 feet which may be converted into a vertical lift when required by navigation. The roadway width is twenty-four feet. The contract was awarded for the sum of $346,600.00. When completed this bridge will form an important link in the State Bond Issue System, and it will also carry heavy local traffic between LaSalle and Oglesby.

4. CLASSIFICATION OF BRIDGE WORK.—The following statement classifies the activities of the Bridge Section for 1926:

Plans Prepared.	Number.	Estimated Cost.
For Counties and Townships	151	$ 462,840.31
For State Bridges	130	3,319,427.53
For Road Contracts	3,669	1,022,440.20
Total	3,950	$4,804,708.04

Contracts Awarded.	Number.	Contract Price.
For Counties and Townships	92	$ 234,906.06
For State Bridges	72	2,467,149.28
Total	164	$2,702,055.34

Plans Approved for County Superintendent of Highways	1145
Old Bridges Investigated	10
Shop Drawings for Steel Bridges Approved	23
Shop Inspection of Steel Bridges	25

5. BRIDGES COMPLETED.—Because of prolonged wet weather and several periods of extreme high water, the year 1926 was very unfavorable for bridge construction. In general, construction work was very slow throughout the State and it was impossible to complete the program as planned. Considerable work was held over to the spring of

1927. The following were some of the most important structures completed during the year:

Kaskaskia River bridge at Evansville on Bond Issue Route 3. Four steel spans of 160 feet each and one of ninety-five feet, and nineteen concrete deck girder spans of fifty feet each. Roadway width twenty-two feet. The ninety-five foot-span may be converted into a vertical lift span when required to allow passage of boats. Total length of bridge 1,752 feet six inches. Contract price, including materials furnished by State, $221,950.00. See Fig. 8.

Spoon River bridge near Maquon on Bond Issue Route 8. This bridge consists of one 170-foot steel span and eleven fifty-foot concrete deck girded spans, with twenty-two-foot roadway. All spans are skewed to fit the channel, which crosses the road at an oblique angle. Contract price $103,255.00. See Fig. 9.

Figure 10 shows the completed bridge across the Rock River at Rockton on Bond Issue Route 2. The bridge is a very good example of the open spandrel type of reinforced concrete arch construction. and consists of eight spans at sixty-five feet each. The roadway is twenty-two feet wide with a five-foot sidewalk on the west side. Total cost $102,772.00.

The bridge across Spoon Siver on Bond Issue Route 9 near Blyton, illustrated in Figure 11, is a well balanced combination of steel and concrete spans. Over the main channel there are two 150-foot steel spans and for the excess flow at high water stages there are provided ten fifty-foot concrete deck girder spans. The roadway width is twenty-two feet, and as can be seen in the photograph, the west end of the bridge is built on a curve to fit the alignment of the highway. Total cost of construction $81,500.00.

C. & N. W. Railroad overhead east of Spring Valley on Bond Issue Route 7. Concrete deck girders, three fifty-foot spans and two forty-foot spans. Roadway twenty-two feet. This structure combines the grade separation and the crossing of Spring Creek. Total cost $21,693.00. See Fig. 12.

Spoon River was well bridged in 1926. Figure 13 shows the third crossing completed that year. This one is near Duncan Mills on Route 31. The two bridges together provide two 150-foot steel spans and eight fifty-foot concrete spans, all with twenty-two-foot roadway. Total cost $84,600.00.

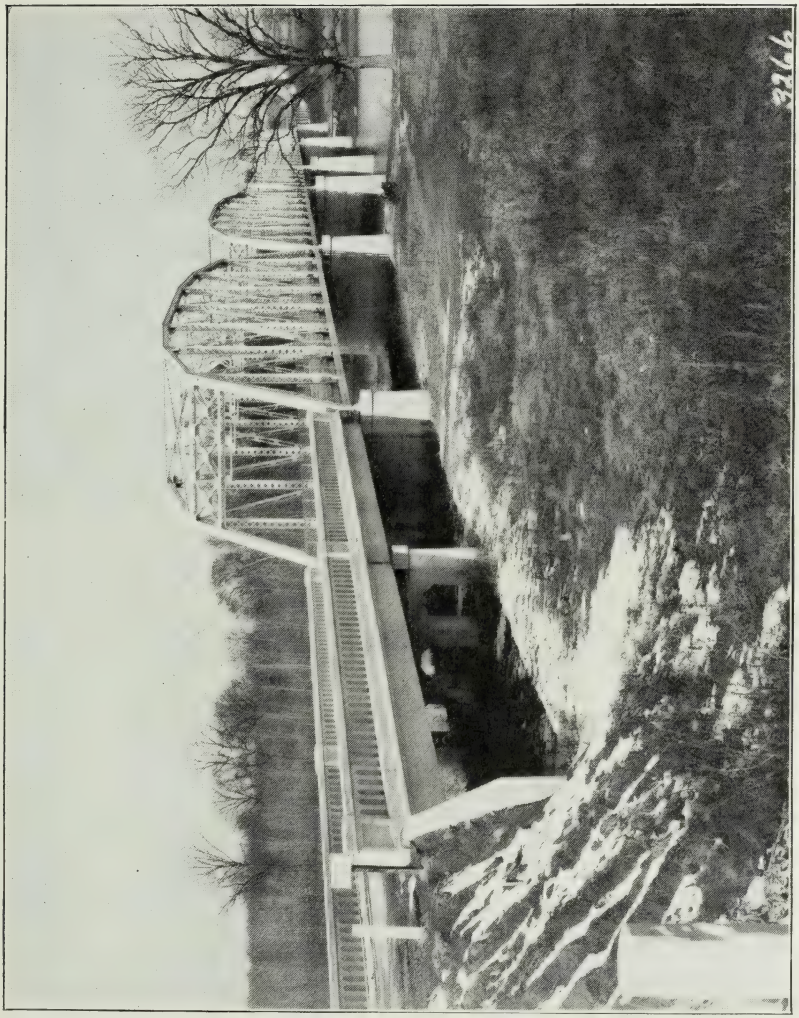


Figure 8.—Kaskaskia River Bridge at Evansville.

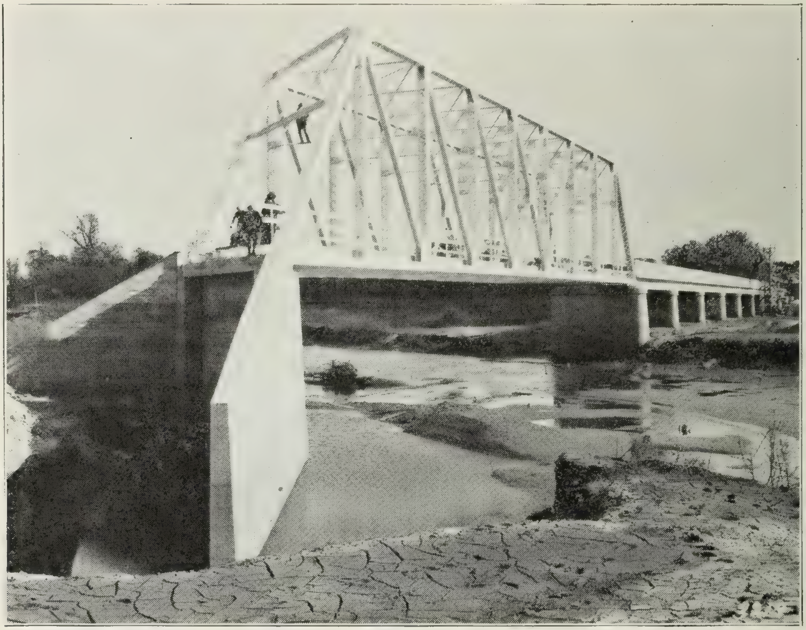


Figure 9.—Spoon River Bridge near Maquon.

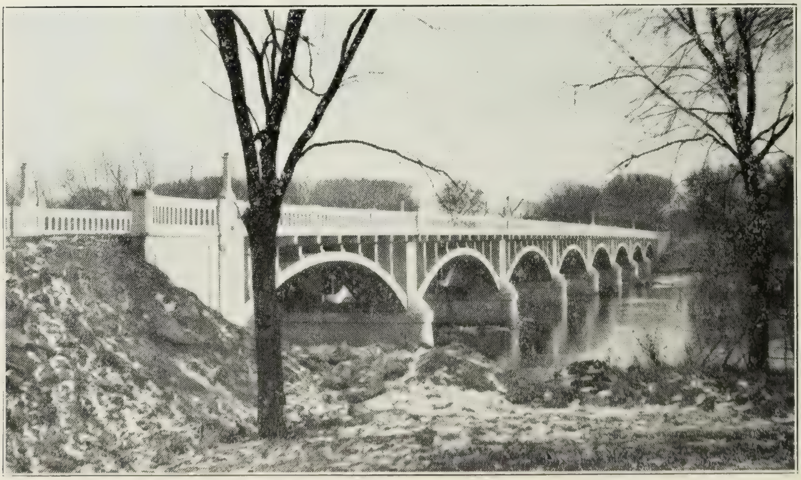


Figure 10.—Rock River Bridge at Rockton.

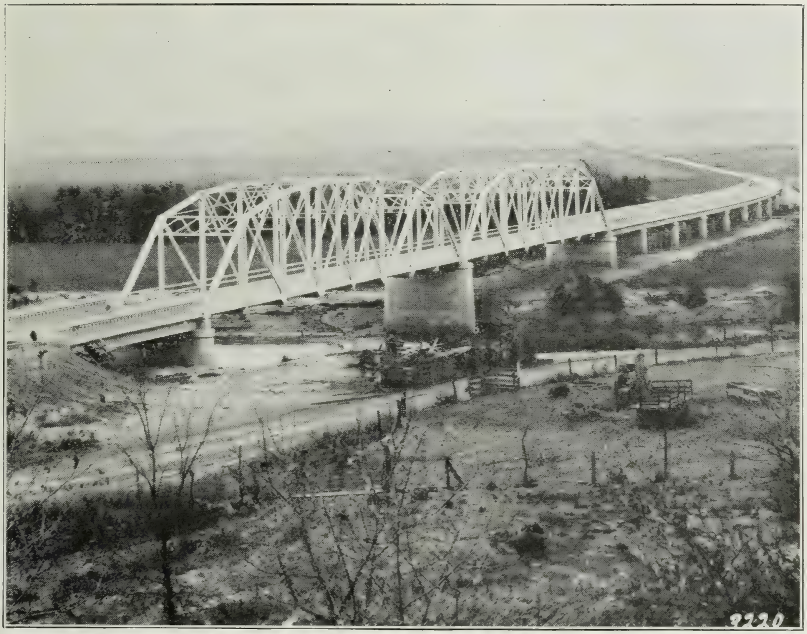


Figure 11.—Spoon River Bridge near Blyton.

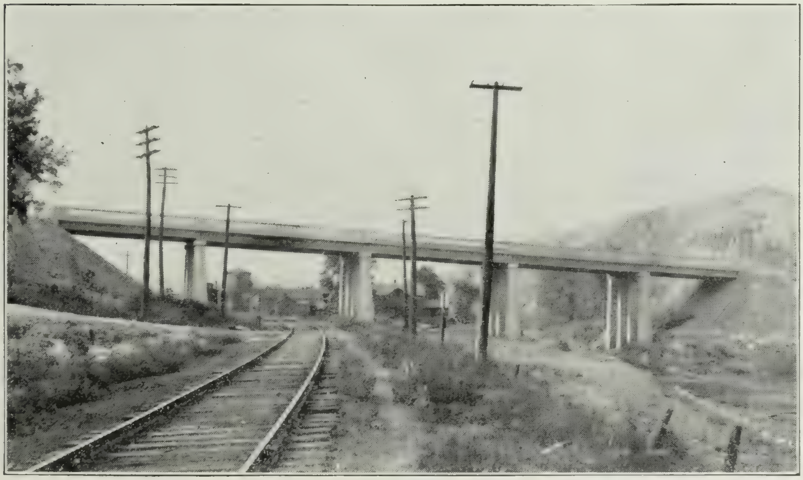


Figure 12.—C. & N. W. Overhead East of Spring Valley.

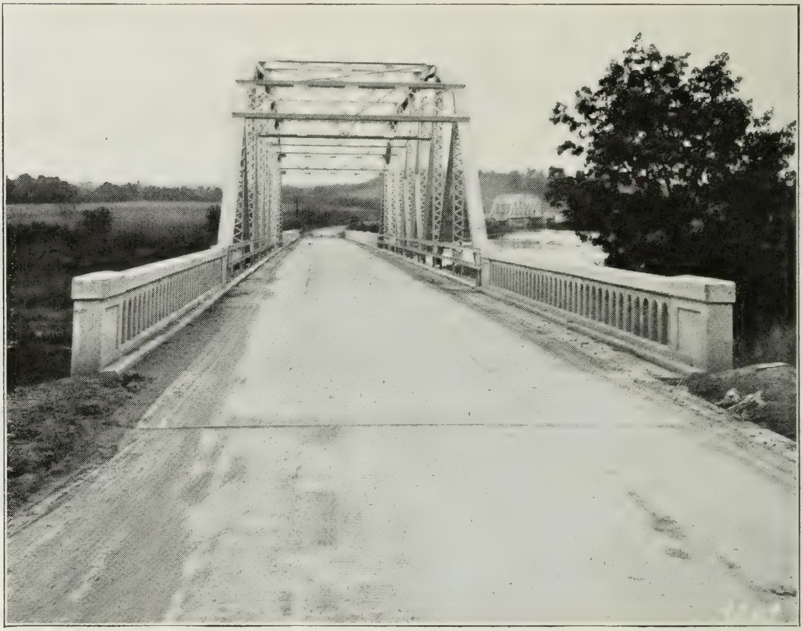


Figure 13.—Spoon River Bridge near Duncan Mills.

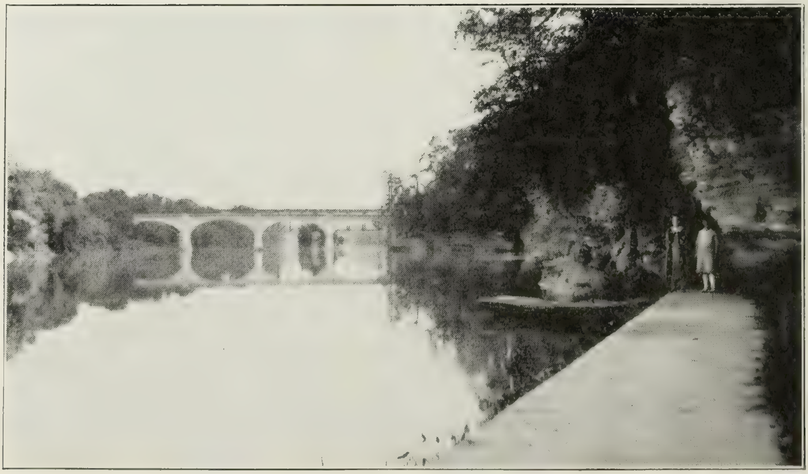


Figure 14.—The Fox River near Sheridan, LaSalle County. A good location for an arch bridge.

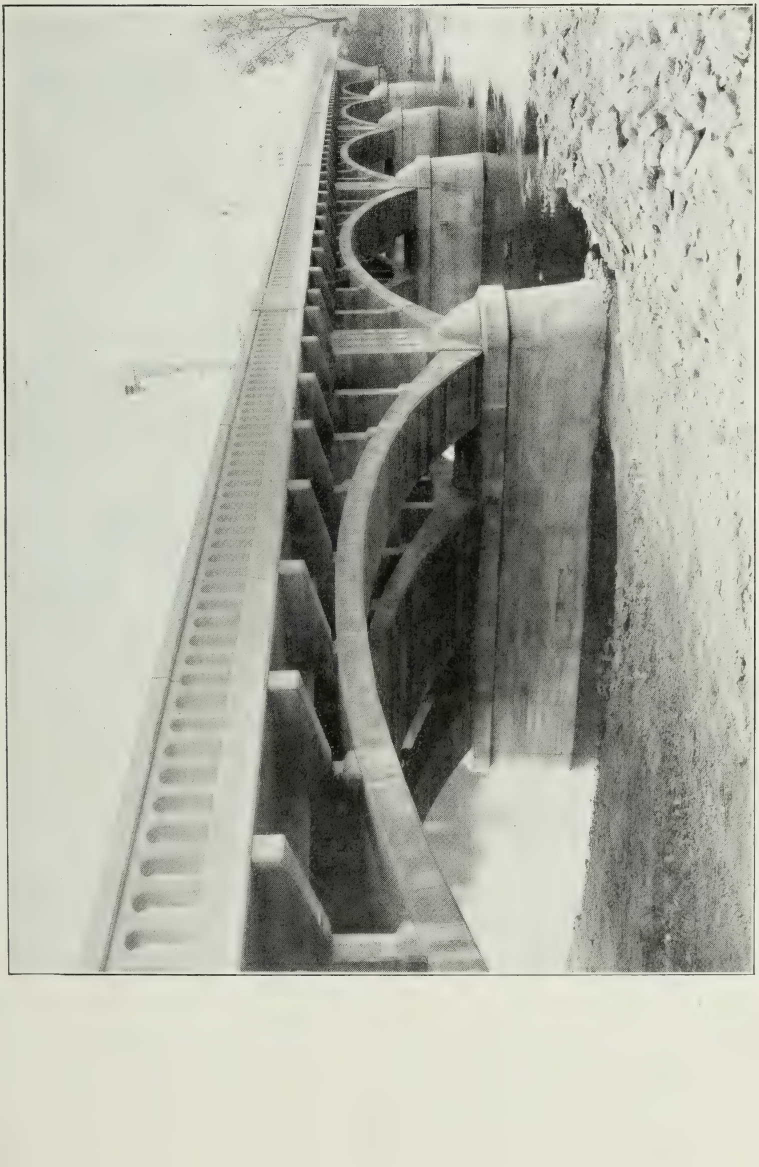


Figure 15.—West Station Street Bridge over Kankakee River on Route 17. Five 70-foot Arches, 30-foot roadway and two 7-foot walks. Contract price $123,908.71.

III. BUREAU OF CONSTRUCTION.

1. BUREAU OF CONSTRUCTION.—The Bureau of Construction supervises the construction of roads and bridges built under the State supervision and makes final inspection when completed; audits and passes estimates allowed contractors for work done; supervises the preparation of Federal aid reimbursements in payment for completed Federal aid roads; supervises the distribution of crushed stone supplied by the two State penitentiaries; and directs the supervision of day labor construction.

2. 1926 CONSTRUCTION PROGRAM.—During 1926 there was completed 463.74 miles of pavement. The mileage of the various types is as follows:

Portland Cement Concrete	437.39
Brick	6.43
Sheet Asphalt	1.22
Macadam	9.71
Gravel	8.99

Of this total 361.79 miles were on the State Bond Issue system, and 101.95 miles were constructed on the State Aid system by the counties under Section 15d of the Road and Bridge Law.

This is the smallest yearly mileage completed since 1921, and is due entirely to legal difficulties encountered which made it impossible to start construction work on the $100,000,000 Bond Issue System.

In addition to the pavement constructed, there were completed 97.95 miles of heavy grading, totaling 1,557,988 cubic yards of earth work, and ninety-one bridges, totaling 37,717 cubic yards of concrete.

Figure 16 shows progress of pavement construction in 1926 and a comparison with progress since 1920. Figure 17 shows a detailed weekly progress record of pavement construction during the season. It will be noted that the period of construction is the same as past years—from May 15th to November 1st.

Table XI shows a summary of 1926 construction. In Table XII is shown general information concerning the 1926 construction activities.

TABLE XI—SUMMARY OF MILEAGE CONSTRUCTED DURING 1926.

	Pavement miles.	Grading miles.	Bridges number.
Carried over from 1925	162.37	34.30	56
Awarded during 1926	507.73	98.26	74
Additions to existing contracts during 1926	9.06	4.90	11
Total for 1926	679.16	137.46	141
Constructed during 1926	*463.74	97.95	91
Carried over to 1927	215.42	39.51	50

NOTE.—The total pavement constructed in 1926 does not include the 0.84 miles of miscellaneous work built by special appropriations.

* Total mileage constructed during 1926 includes 4.69 miles of widened or replaced narrow pavement.

TABLE XII. GENERAL SUMMARY OF 1926 CONSTRUCTION.

Paving contractors, including county work under section 15d of the Road & Bridge Laws		121
Grading contractors, including county 15d work		63
Bridge contractors, including county 15d work		59
Total number of paving, grading and bridge contractors having State or county work in 1926		243
Paving sections under contract in 1926—		
State Bond Issue and Federal Aid	221	
County 15d	83	
Miscellaneous	4	
Total		308
Non-ridgid type pavement sections: W. B. Macadam 8; gravel 8; total		16
Grading sections under contract in 1926: S. B. I. & F. A., 55; 15d, 53, miscl., 1; total		99
Bridge sections under contract in 1926: S. B. I. & F. A., 102; 15d, 21; total		123
Number of paving mixers operating on State or county work: S. B. I. & F. A., 104; 15d, 27; total		131
Number of paving mixers operated with industrial railroad: S. B. I. & F. A., 10; 15d, 1; total		11
Number of paving mixers operated with trucks: S. B. I. & F. A., 94; 15d, 26; total		120
Number of paving mixers operated from central proportioning plants: S. B. I. & F. A., 99; 15d, 26; total		125
Number of paving mixers operated from central mixing plants: S. B. I. & F. A., 5; 15d, 1; total		6
Largest day's run in feet		1,409
Largest week's run in feet		6,992
Largest month's run in feet		21,841

Four thousand five hundred men and 850 teams were employed directly in the construction of road and bridge work this year.

3. CONSTRUCTION ACCOMPLISHMENTS.

(a) *Construction Under House Bill 433.*—Several important gaps on otherwise completed through roads were completed under the provisions of House Bill 433. Important gaps so completed were through Virden on Route 4; Jerseyville on Route 3; Marseilles on Route 7; Vandalia on Route 11; Anna on Route 2; and Galva on Route 28.

(b) *Large Bridges Completed.*—Several large bridges were completed, the most important of which were at Evansville on Route 3; at Rockton on Route 2; east of Lawrenceville on Route 12; over the Sangamon River on Route 24; the grade separation east of Elgin on Route 5: the Cass Street viaduct, and the Rock Island Subway at Joliet on Route 22.

Figure 21 shows construction accomplishments from January 1, 1921, to January 1, 1927.

4. TRANSPORTATION, LABOR AND WEATHER CONDITIONS.—Railroad transportation conditions during the year were normal at all times, and no lack of cars to transport aggregates or cement was experienced. Labor conditions were normal, and prices, except in the Chicago district, remained at past prevailing rates. In the Chicago districts the labor unions appreciably increased prices for both skilled and unskilled labor.

Weather conditions during the first six months of 1926 were normal. and average construction progress was maintained. Beginning with the middle of August, one of the worst periods of wet weather encountered for years was experienced in the central and northern portions of the State. Unusual floods occurred and new high water marks were established throughout the entire Illinois River valley.

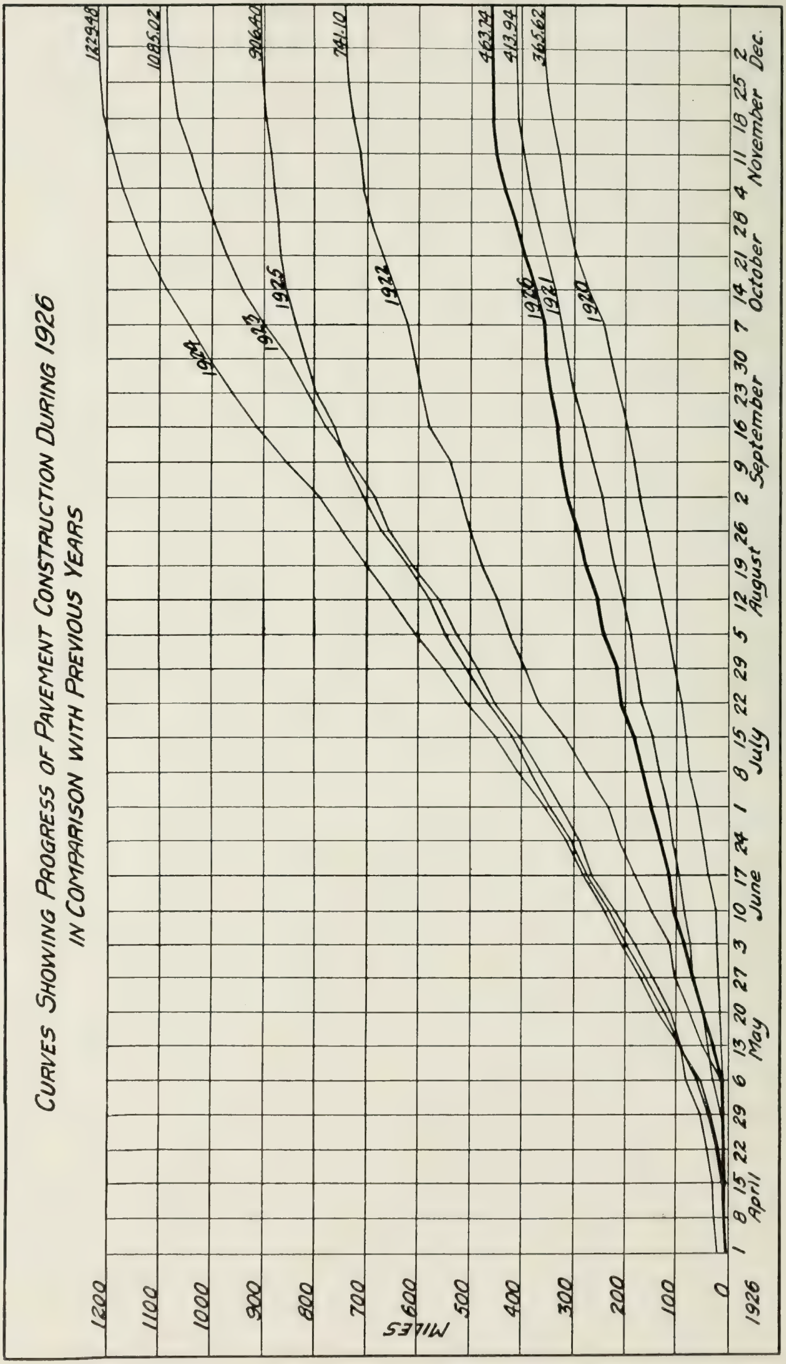

CURVES SHOWING PROGRESS OF PAVEMENT CONSTRUCTION DURING 1926
IN COMPARISON WITH PREVIOUS YEARS
MILES
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
1926
1 8 15 22 29
April
6 13 20 27
May
3 10 17 24
June
1 8 15 22 29
July
5 12 19 26
August
2 9 16 23 30
September
7 14 21 28
October
4 11 18 25
November
2
Dec.
1329.48
1085.02
906.40
741.10
463.74
413.94
365.62
1924
1923
1925
1922
1926
1921
1920

Figure 16.

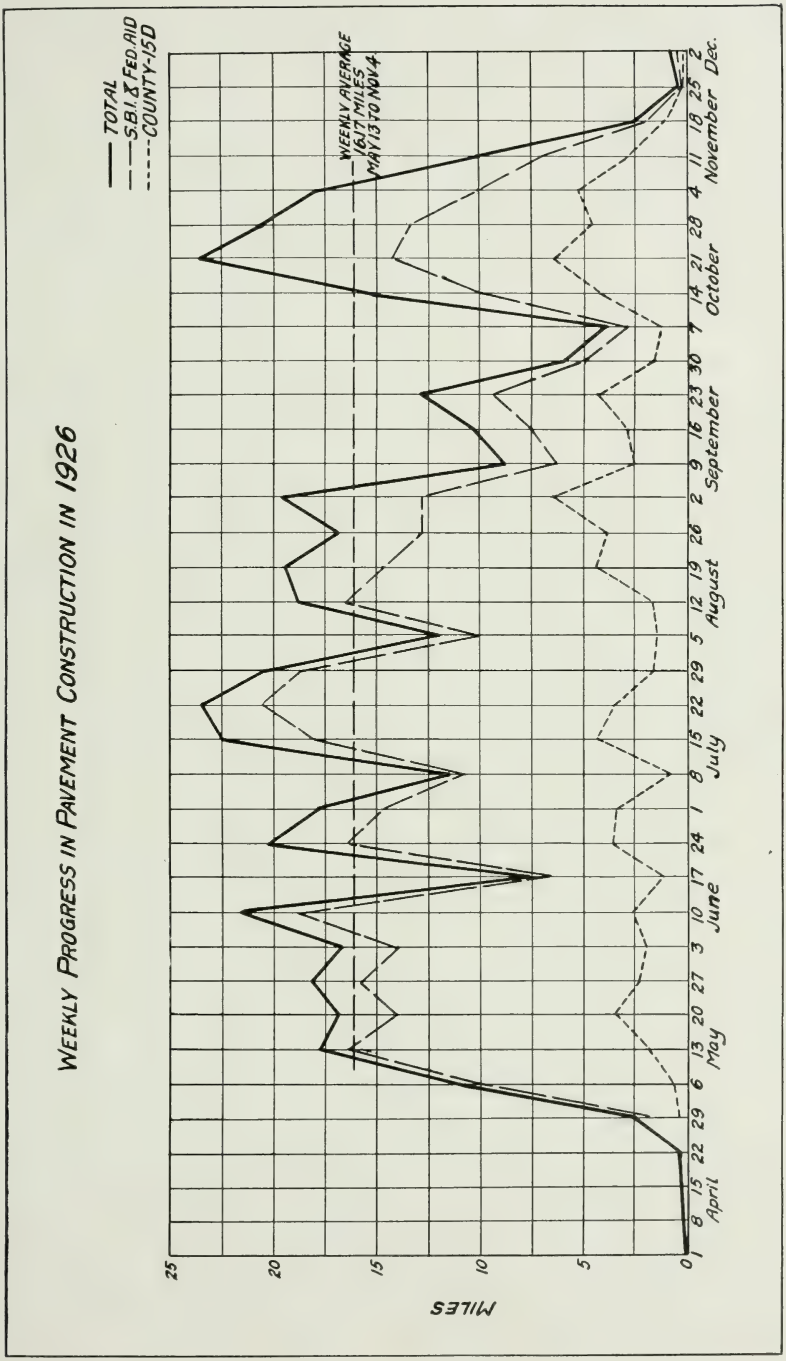

WEEKLY PROGRESS IN PAVEMENT CONSTRUCTION IN 1926
TOTAL
S.B.I. & FED. AID
COUNTY-15D
WEEKLY AVERAGE 16.17 MILES MAY 13 TO NOV 4
MILES
0
5
10
15
20
25
April
1
8
15
22
29
May
6
13
20
27
June
3
10
17
24
July
1
8
15
22
29
August
5
12
19
26
September
2
9
16
23
30
October
7
14
21
28
November
4
11
18
25
Dec.
2

Figure 17.

5. COST OF EIGHTEEN-FOOT CONCRETE PAVEMENT.—Information based on the average construction cost per mile for 753 miles of eighteen-foot concrete pavement, consisting of sections taken from all parts of the State and including all heavy grading and bridge contracts on these sections, shows a cost distribution as shown in Figure 23. This total mileage includes 126 miles constructed in 1922, 114 miles in 1923, 113 miles in 1924, 203 miles in 1925 and 197 miles in 1926. It is interesting to note that each item shown in the diagram varies less than 4 per cent from the figures of the individual years used in making up the average. The miscellaneous section includes guard fence, catch basins, section markers, gutters and all extra work not included under other headings.

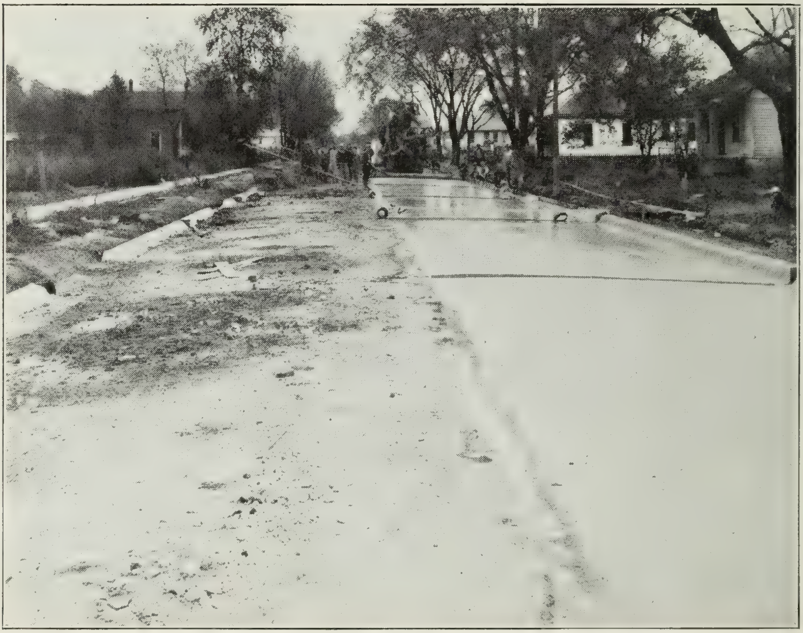


Figure 18.—City widening job in Marseilles, LaSalle County, on Bond Route 7, Section G-W.

As a result, all work in this section of the State was at a standstill until late in October, and then cold weather made it impracticable to resume pavement construction. Consequently, 215 miles of pavement and many sections of heavy grading and bridge work will be carried over to 1927.

Weather reports show that in central Illinois the rainfall for 1926 was 46.4 inches, as compared with a normal rainfall of thirty-six inches, while for the year average throughout the State was 42.9 inches, as compared with a normal rainfall of 36.4 inches.

6. CONSTRUCTION POLICIES.—Outstanding construction policies during 1926 were:

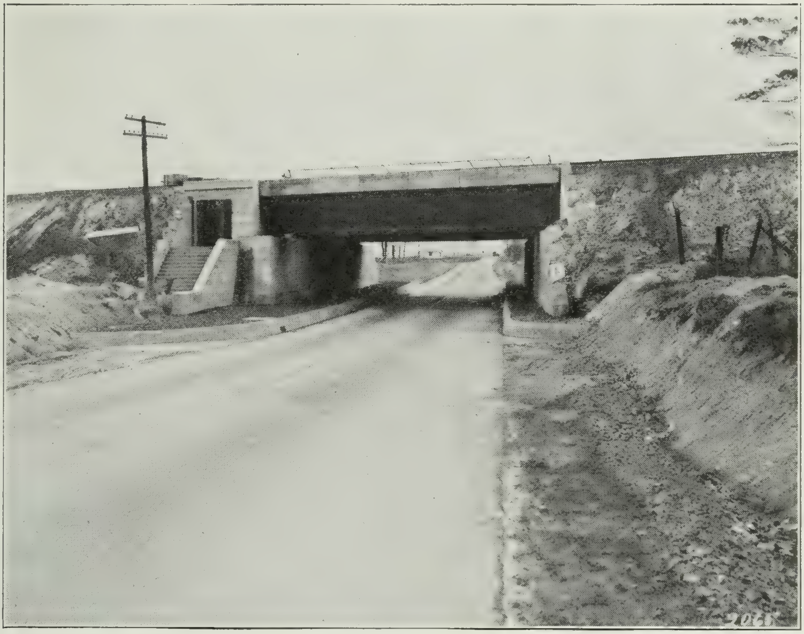


Figure 19.—Mattison Subway, 4 miles west of Chicago Heights on Lincoln Highway, Cook County. Bond Route 22, Section 42-S.

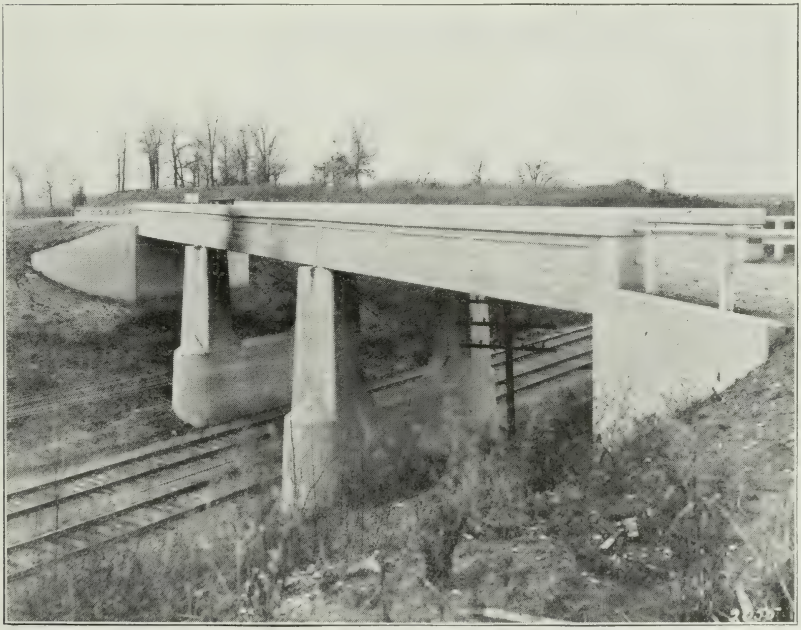


Figure 20.—Ela viaduct over C. & N. W. tracks at Barrington, Lake County.

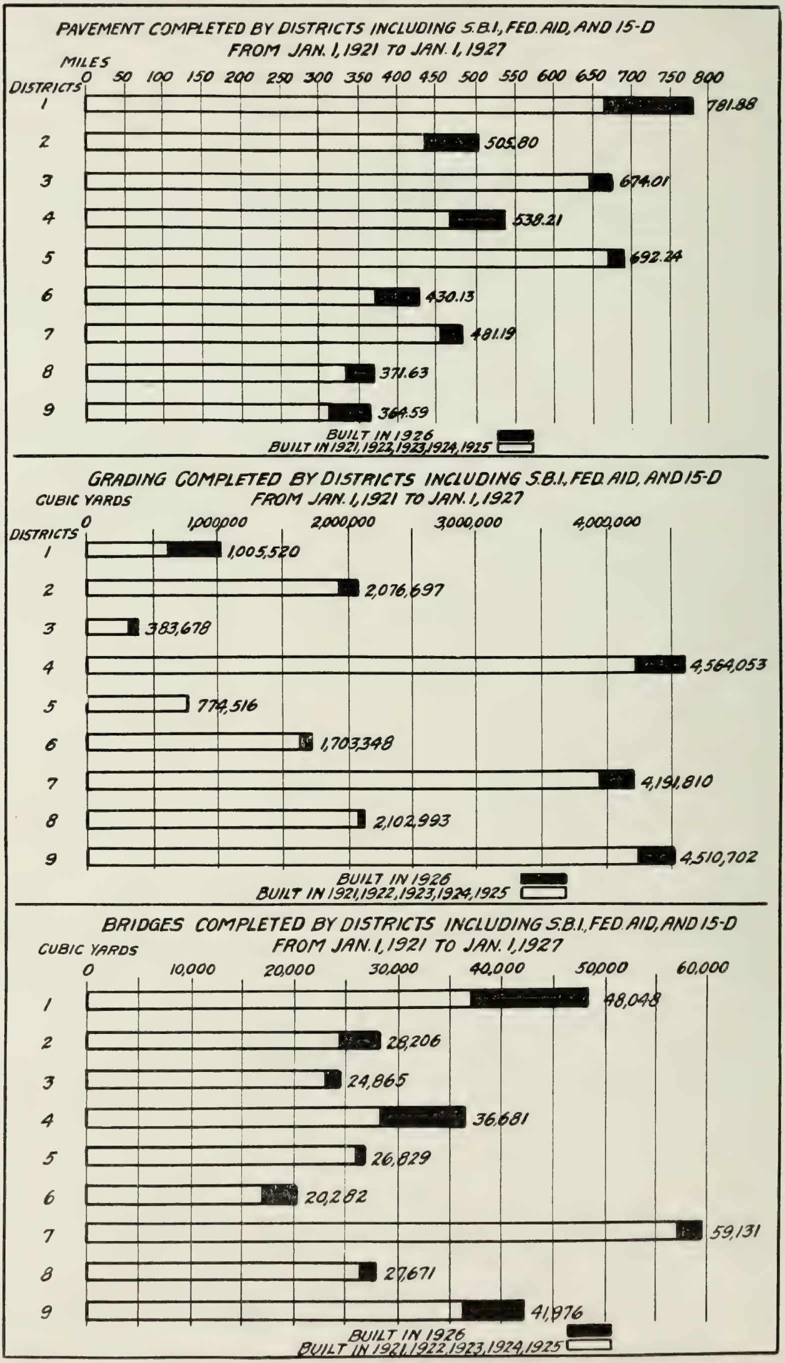

PAVEMENT COMPLETED BY DISTRICTS INCLUDING S.B.I., FED. AID, AND 15-D
FROM JAN. 1, 1921 TO JAN. 1, 1927
MILES
DISTRICTS
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800
1 781.88
2 505.80
3 674.01
4 538.21
5 692.24
6 430.13
7 481.19
8 371.63
9 364.59
BUILT IN 1926
BUILT IN 1921, 1922, 1923, 1924, 1925
GRADING COMPLETED BY DISTRICTS INCLUDING S.B.I., FED. AID, AND 15-D
FROM JAN. 1, 1921 TO JAN. 1, 1927
CUBIC YARDS
DISTRICTS
0 1,000,000 2,000,000 3,000,000 4,000,000
1 1,005,520
2 2,076,697
3 383,678
4 4,564,053
5 774,516
6 1,703,348
7 4,191,810
8 2,102,993
9 4,510,702
BUILT IN 1926
BUILT IN 1921, 1922, 1923, 1924, 1925
BRIDGES COMPLETED BY DISTRICTS INCLUDING S.B.I., FED. AID, AND 15-D
FROM JAN. 1, 1921 TO JAN. 1, 1927
CUBIC YARDS
0 10,000 20,000 30,000 40,000 50,000 60,000
1 48,048
2 28,206
3 24,865
4 36,681
5 26,829
6 20,282
7 59,131
8 27,671
9 41,976
BUILT IN 1926
BUILT IN 1921, 1922, 1923, 1924, 1925

Figure 21.

(a) *Checking pavement thickness.* Four hundred fourteen miles were cored. No section was found less than the required thickness and the average thickness of all pavements cored showed an excess of 8½ per cent over the required thickness.

(b) *Securing better quality of concrete by the careful measurement and proportioning of aggregates.* Tests on cores taken during 1925 showed an appreciable increase in strength over previous years. In many instances this increase was 1,500 pounds per square inch greater than the average estimated strength.

(c) *Field tests for pavement strength and application of the results to the time of opening pavements.* In some instances, where conditions warranted, daily strength tests were made by means of test beams, and the pavement was opened to traffic when the required strength was reached.

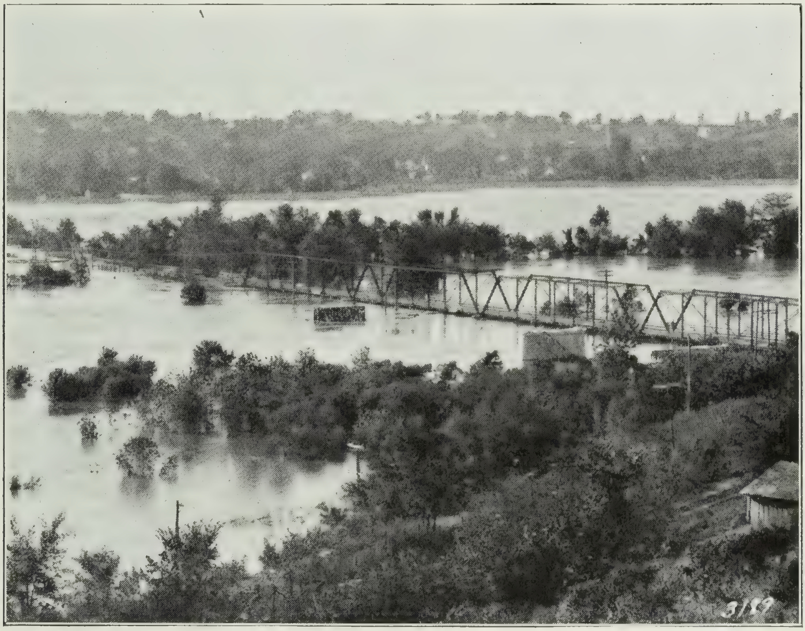


Figure 22.—Flood conditions looking west at Sangamon River Bridge, one-half mile East of Petersburg, Menard County.

(d) *Permitting the use of rail and hard grade steel.*

(e) *Watersoaking earth fills before paving, thus eliminating temporary surfaces and reducing maintenance due to settlements.*

It has become more and more apparent during the past two years, that the Construction Bureau is not only concerned with methods and details of construction, but also with the securing of both full quantity of concrete and high quality. Continued study of the features affecting quantity and quality are of prime importance and research work and experiments in connection with the Bureau of Materials should be carried on each year with this end in view.

7. CEMENT SHIPMENTS.—Figure 27 shows the monthly cement shipments for 1926 as contrasted with previous years. When bids were received for our cement requirements, the cement companies offered five times the amount of cement actually required and at all times during the season, showed an ability to make shipments as required.

8. DAY LABOR.—Four day labor outfits were in operation during 1926, but their program was curtailed approximately in the same proportion as the contract work. Consequently, two of the units were employed chiefly in the construction of short pieces of road which had been maintained as gravel sections, and on short sections where it was difficult to obtain satisfacory contract prices. Two additional outfits were used to advantage in the late months of the year as hauling units in the construction of temporary cinder detour roads.

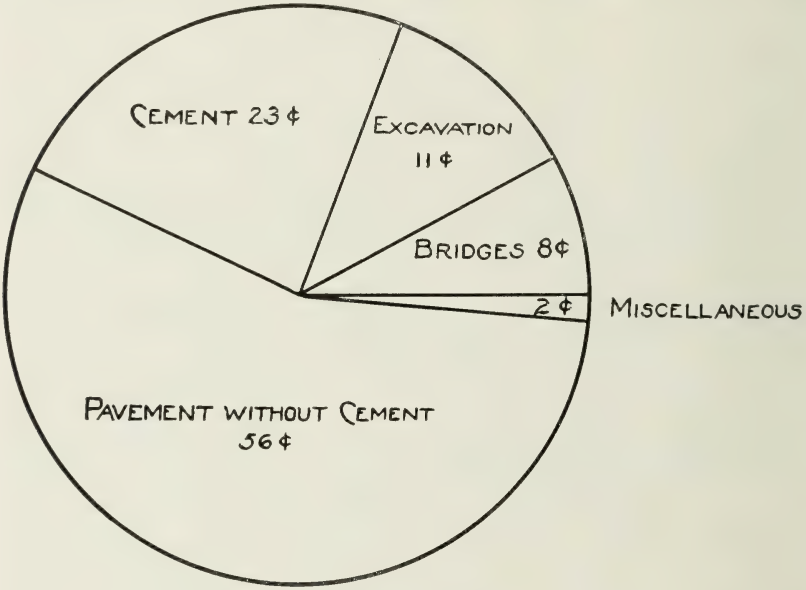


Figure 23.

Another activity developed for the day labor organization was the construction of approximately fifty miles of guard fence which was started in the fall of 1926. This particular work is considered ideal for outfits of this sort, since the work can be done during winter months, thus keeping the organization largely intact, and working at a time when ordinary construction is at a standstill.

9. PENITENTIARY STONE.—Figure 31 shows figures on shipment of stone from the two State penitentiaries. As in past years, it is evident that the amount of stone required far exceeds the supply. From Figure 31 it is interesting to note the amount of stone utilized by the several counties adjacent to State penitentiaries, showing the possibility of what might be accomplished if such sources of supply could be developed at other points throughout the State.

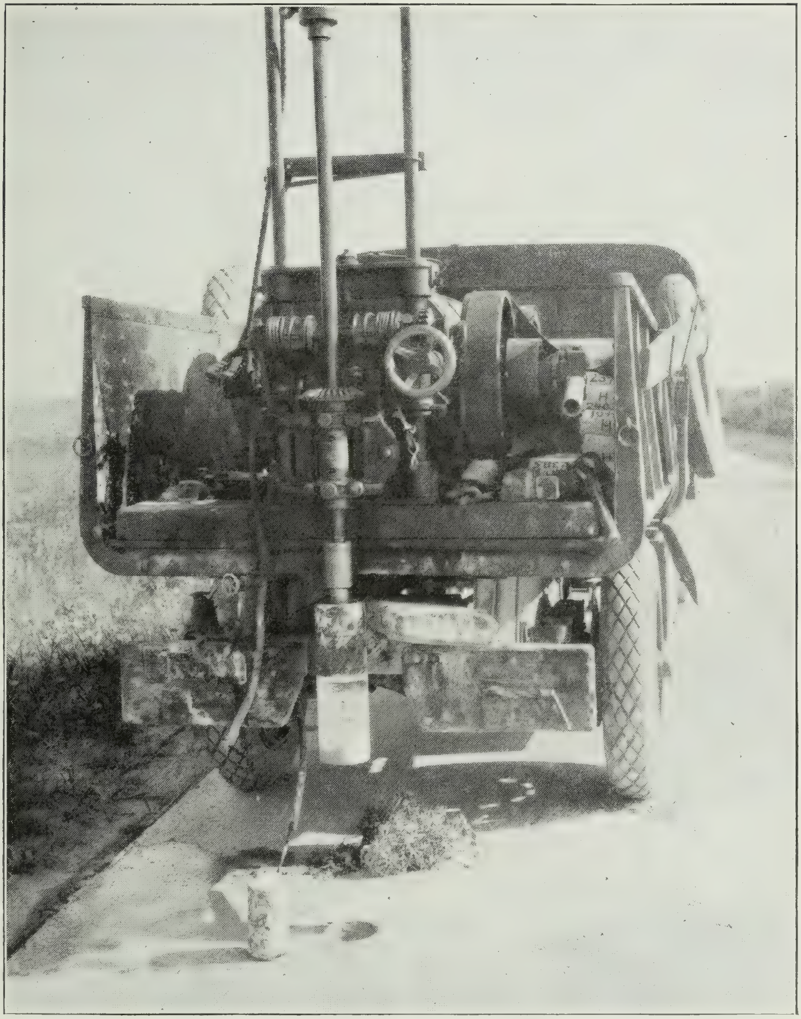


Figure 24.—Calyx Core Drill used for checking pavement thickness.

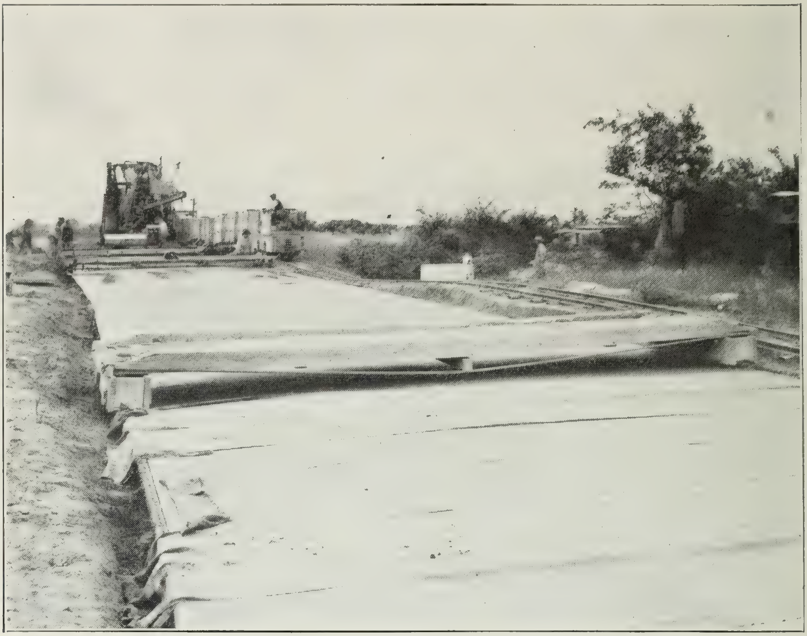


Figure 25.—Curing of newly laid pavement with burlap.

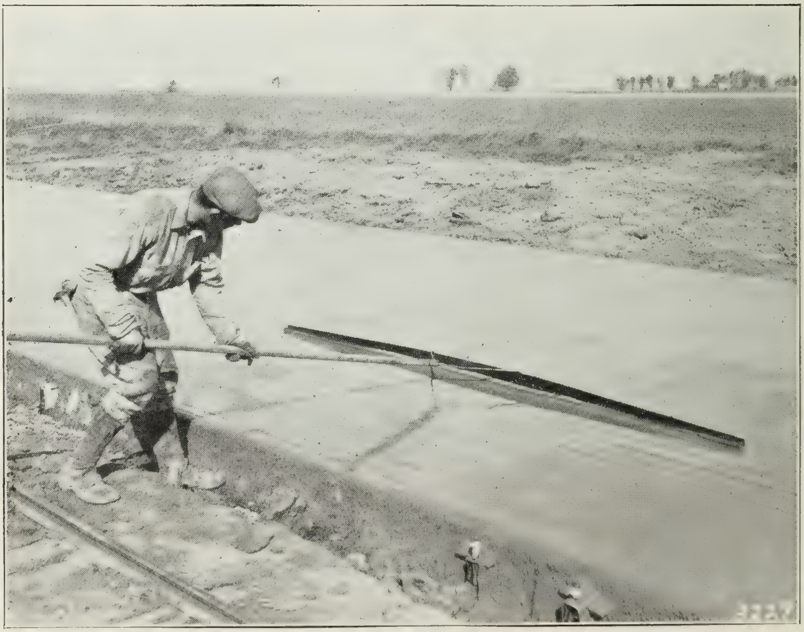


Figure 26.—Removing laitance from pavement with straight edge.

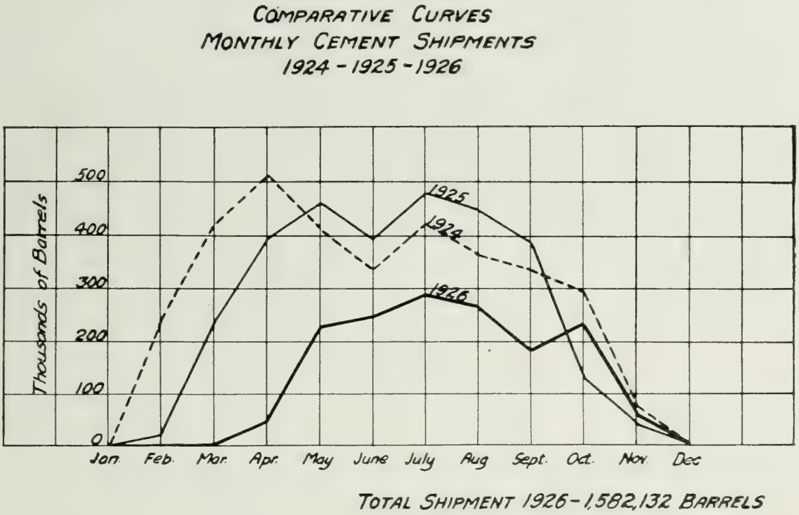


Figure 27.

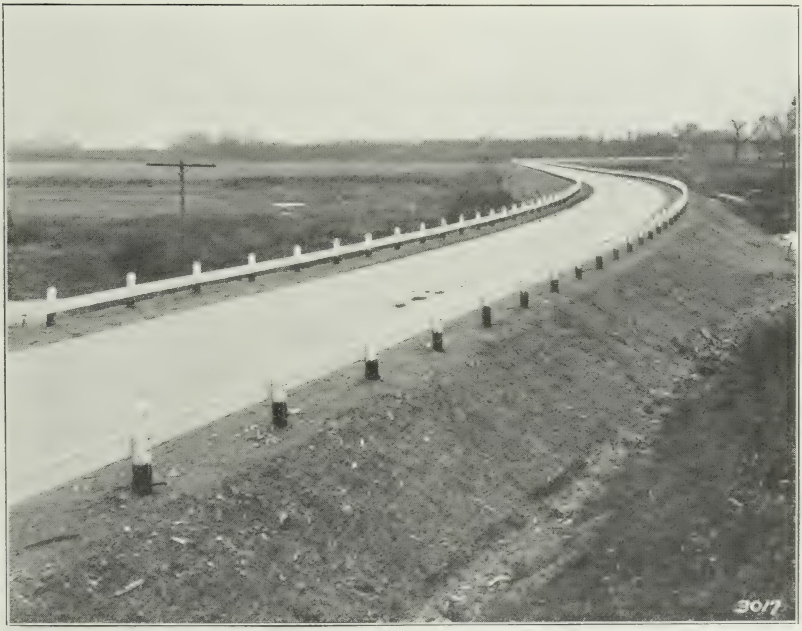
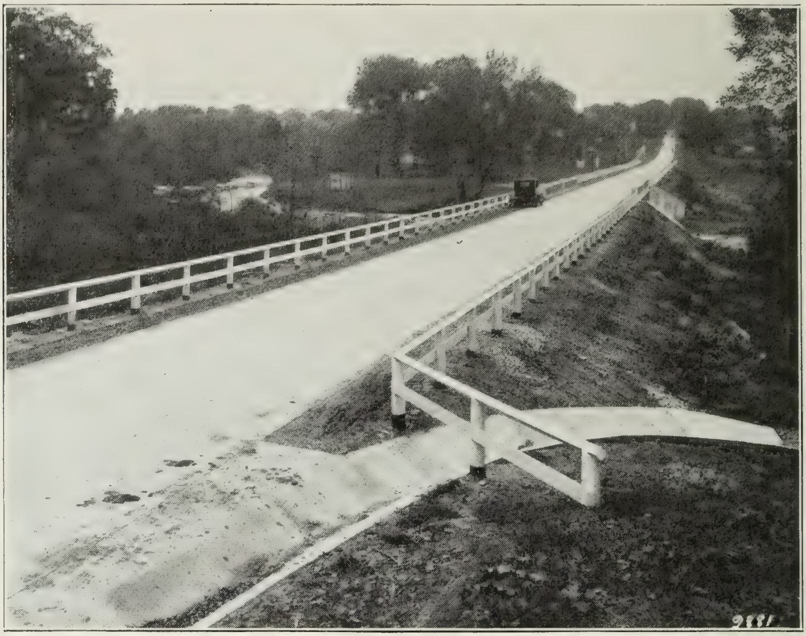


Figure 28.—Guard fence constructed north of Chillicothe, Peoria County, on Bond Route 29, Section M-4.



Fgure 29.—Guard fence constructed in Adams County, on Route 36, Section 10.

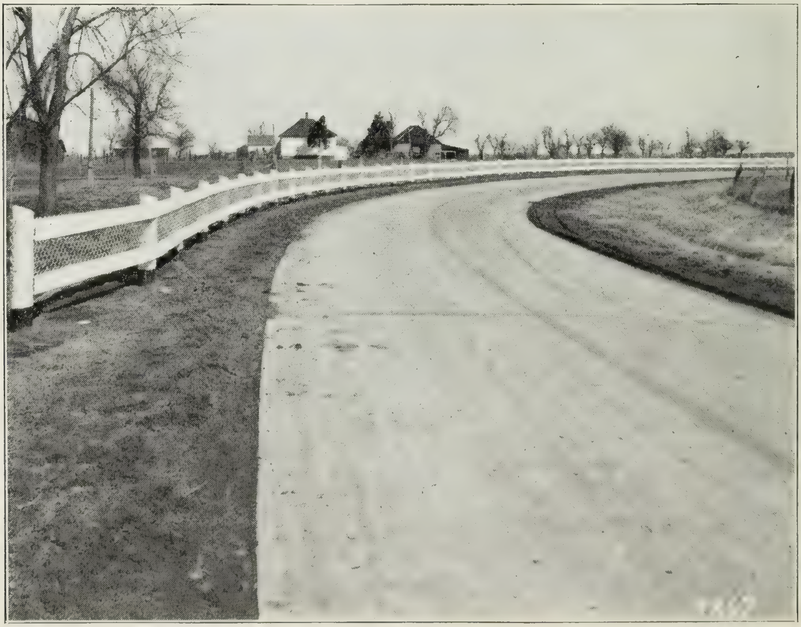


Figure 30.—Guard fence constructed near Athens, Menard County, on Route 24.

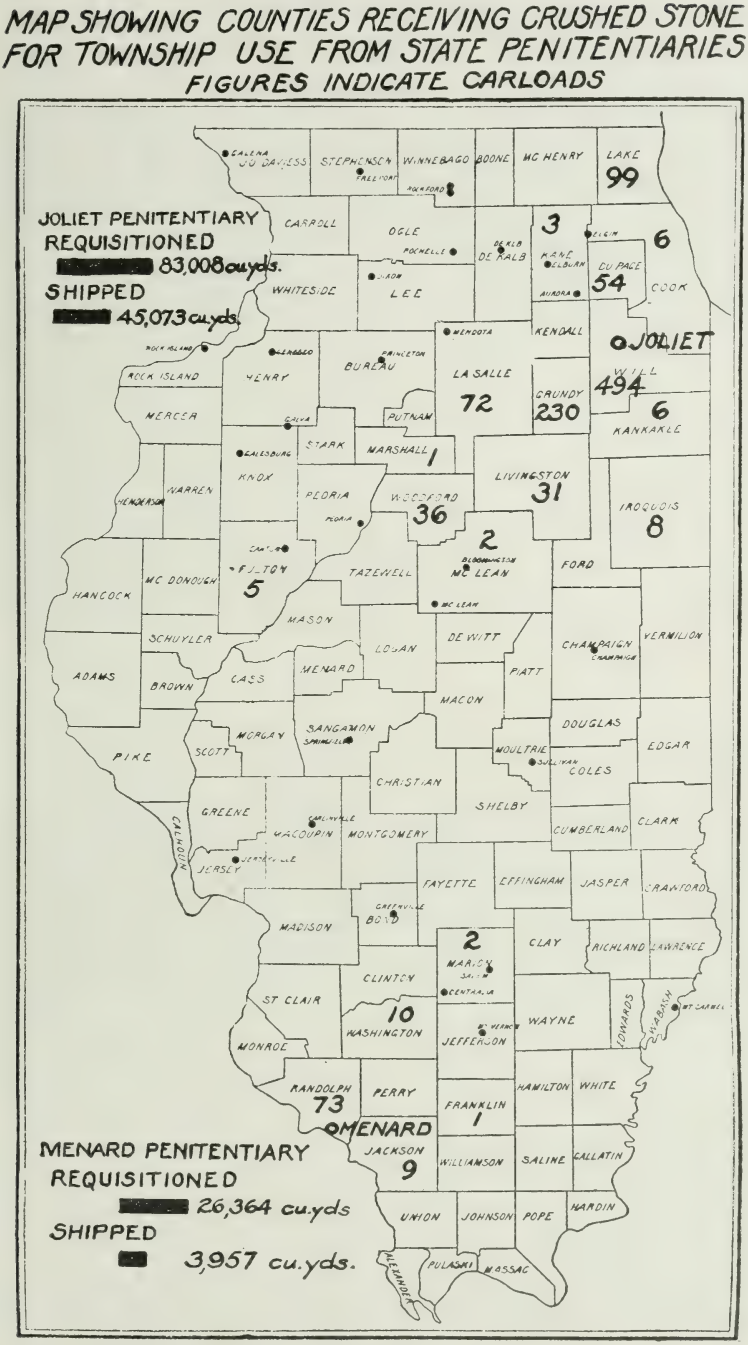

MAP SHOWING COUNTIES RECEIVING CRUSHED STONE FOR TOWNSHIP USE FROM STATE PENITENTIARIES
FIGURES INDICATE CARLOADS

Figure 31.

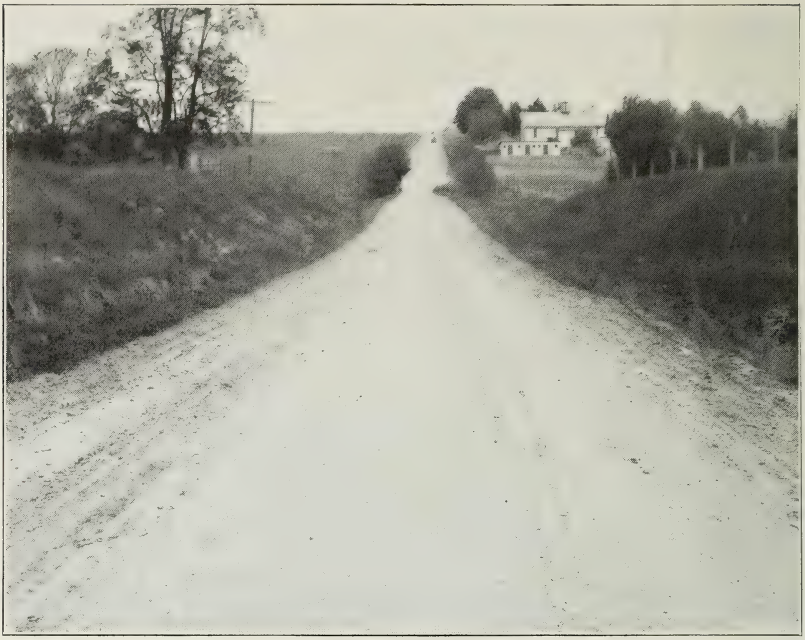


Figure 32.—Before construction: Bond Route 36, Section 10, 2 miles south of Ursa, Adams County.

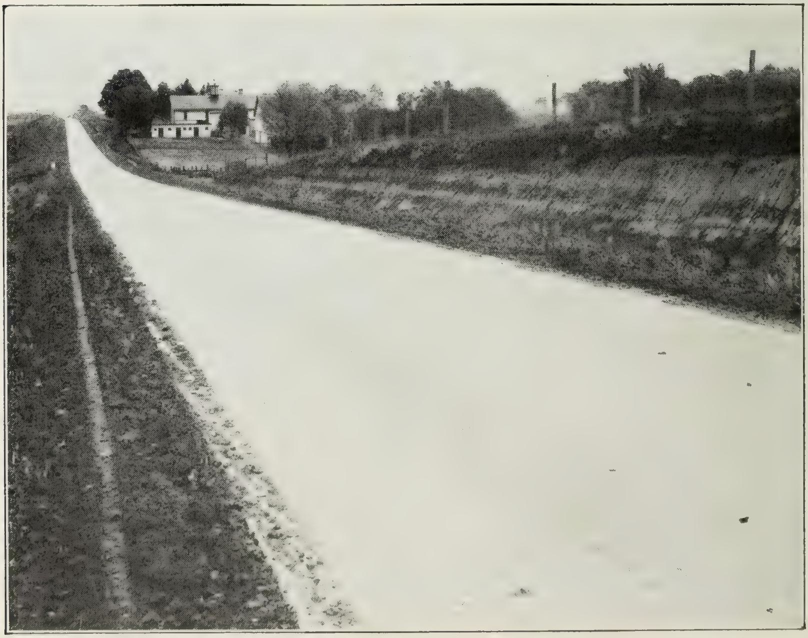


Figure 33.—After construction: Bond Route 36, Section 10, 2 miles south of Ursa, Adams County.

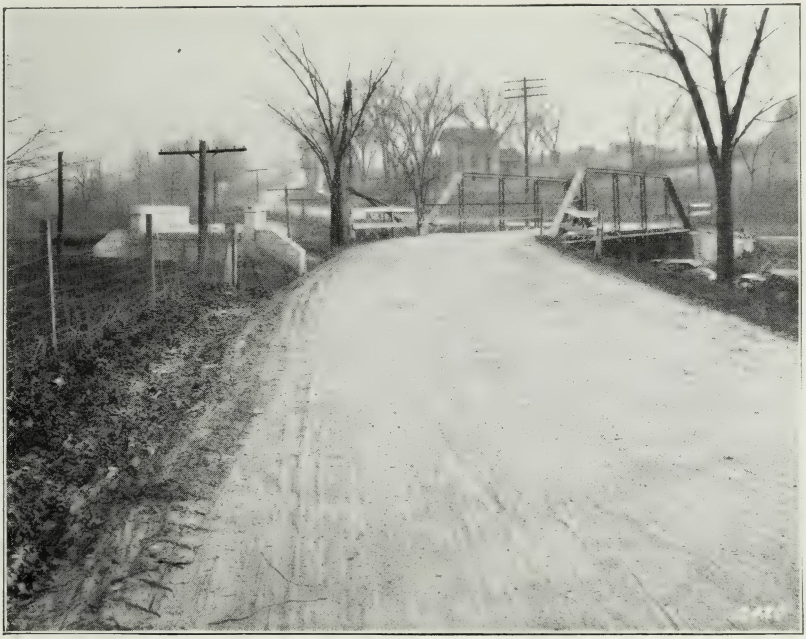


Figure 34.—Before construction: Bond Route 3, Section 51, Green County.

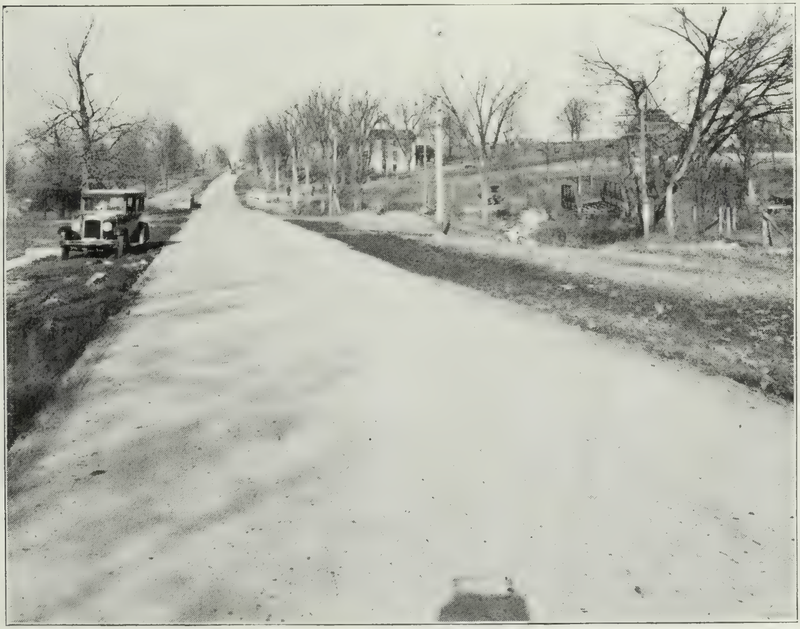


Figure 35.—After construction: Bond Route 3, Section 51, Green County.

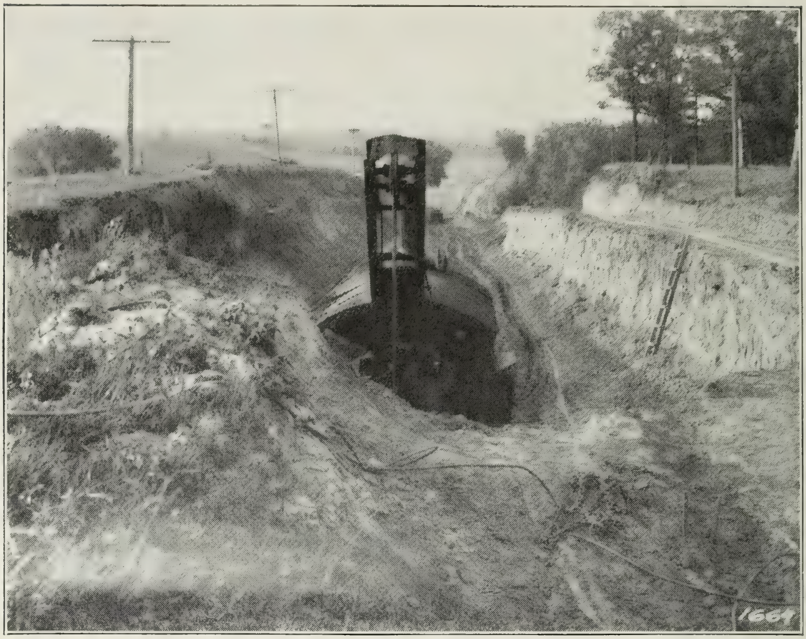


Figure 36.—Before construction: Bond Route 36, Section 22, Scott County.

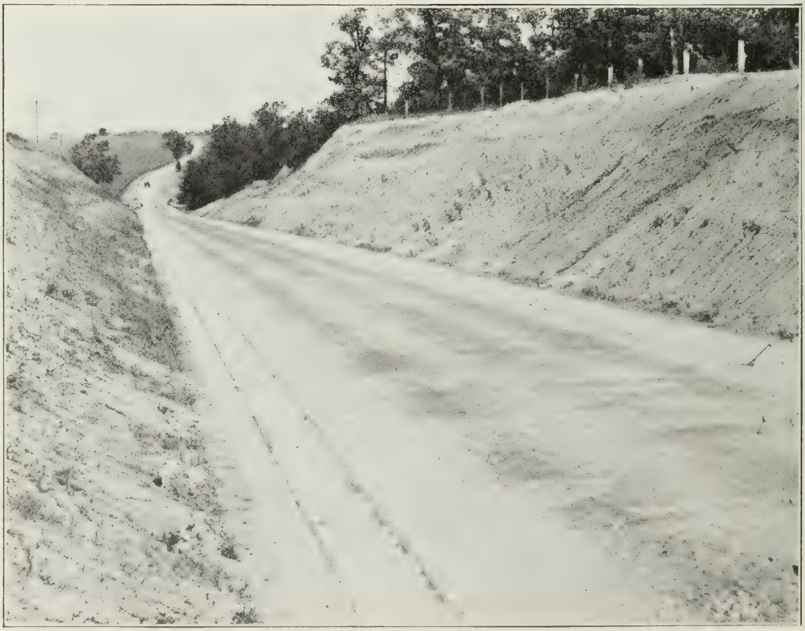


Figure 37.—After construction: Bond Route 36, Section 22, Scott County.

IV. BUREAU OF MAINTENANCE.

1. ORGANIZATION AND DUTIES.—The following graphic chart (Figure 38) shows the organization which has been perfected for carrying on the work of the Bureau of Maintenance in the various districts of the State:

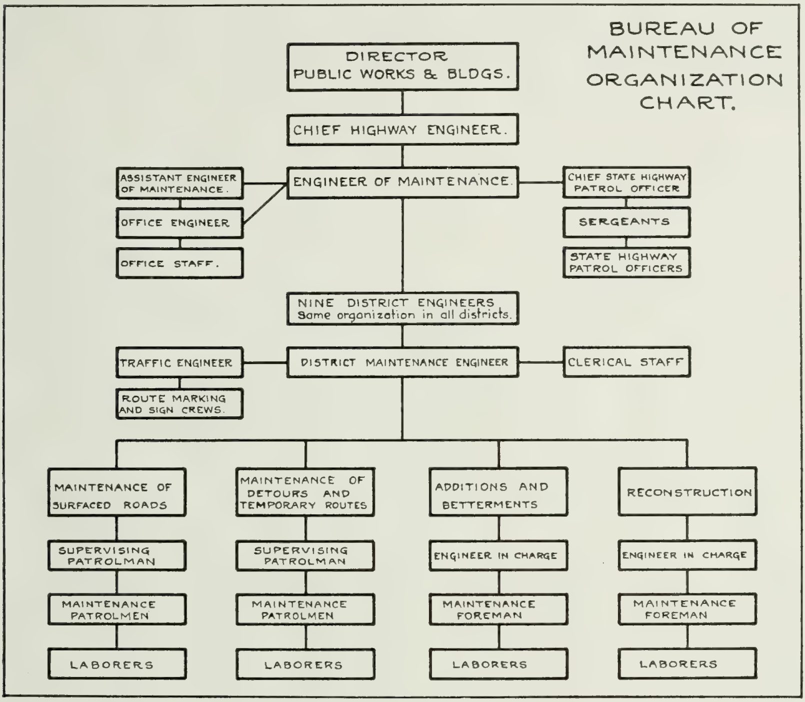

BUREAU OF MAINTENANCE ORGANIZATION CHART.
DIRECTOR PUBLIC WORKS & BLDGS.
CHIEF HIGHWAY ENGINEER.
ASSISTANT ENGINEER OF MAINTENANCE.
OFFICE ENGINEER
OFFICE STAFF.
ENGINEER OF MAINTENANCE.
CHIEF STATE HIGHWAY PATROL OFFICER
SERGEANTS
STATE HIGHWAY PATROL OFFICERS
NINE DISTRICT ENGINEERS Same organization in all districts.
TRAFFIC ENGINEER
ROUTE MARKING AND SIGN CREWS.
DISTRICT MAINTENANCE ENGINEER
CLERICAL STAFF
MAINTENANCE OF SURFACED ROADS
MAINTENANCE OF DETOURS AND TEMPORARY ROUTES
ADDITIONS AND BETTERMENTS
RECONSTRUCTION
SUPERVISING PATROLMAN
SUPERVISING PATROLMAN
ENGINEER IN CHARGE
ENGINEER IN CHARGE
MAINTENANCE PATROLMEN
MAINTENANCE PATROLMEN
MAINTENANCE FOREMAN
MAINTENANCE FOREMAN
LABORERS
LABORERS
LABORERS
LABORERS

Figure 38.

The work in the field is carried on by maintenance patrolmen who report to supervisors who in turn are responsible to the District Maintenance Engineer for the class of work on which they are employed. The District Maintenance Engineer reports to the District Engineer, who is responsible to the Engineer of Maintenance for the proper conduct of each class of work in his district.

A patrol marking system has been perfected whereby the first figure of the patrol number indicates the district in which the patrol is located, the second figure indicates the type of road, and the third, fourth or fifth figures indicates the number of the patrol of that type in that district; the patrols being so arranged, according to number, that the oldest pavement is numbered first with the various years of construction of such types following each other in numerical sequence. This system of marking patrols enables the Division to collect costs not only according to districts, but also by types and ages of types. From the information thus collected any progressional increase of costs as the pavements become older can be determined.

A system of control over the authorization of funds and construction of additions and betterments has been devised whereby it is possible for the Engineer of Maintenance to control the construction of such items, which consist of improvements to existing roads, and to regulate the amount of funds expended for such purposes.

A highway patrol organization has been perfected consisting of one chief, twelve sergeants and 109 officers. The patrolmen are responsible to the sergeants, reporting to a chief highway patrol officer, who in turn is responsible to the Engineer of Maintenance. The duties of this organization are to prevent the overloading of trucks, and provide for the safety of the traveling public by warning speeders and arresting drunken or reckless drivers. This organization has no connection with the district organization, and is employed solely for the purpose of carrying out the provisions of the motor vehicle act.

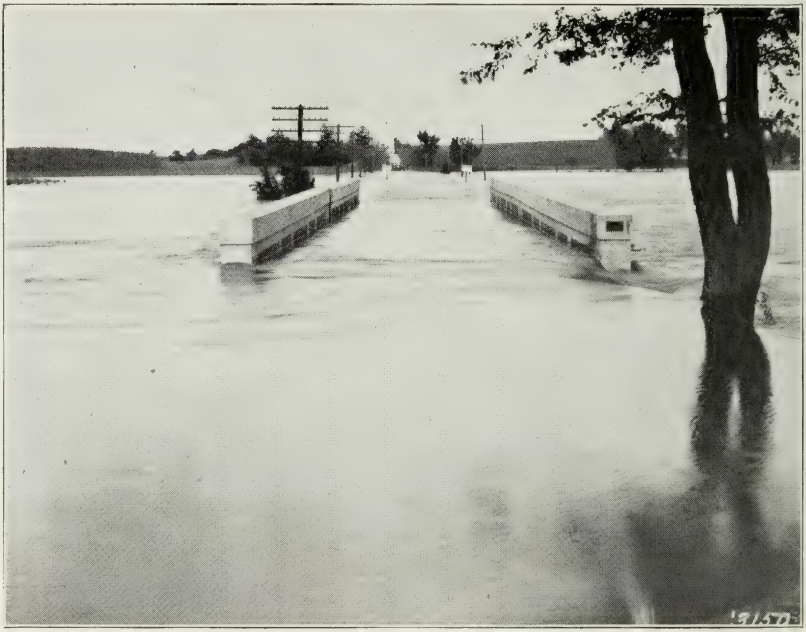


Figure 39.—A typical 1926 flood condition.

All bills incurred by maintenance forces or by the highway patrol organization must be submitted to the Bureau of Maintenance for examination and approval before payment. Maintenance field forces are not permitted to incur indebtedness on any single item in excess of $25.00 without permission or authority from the main office of the Bureau of Maintenance.

All labor employed to assist patrolmen in the performance of their duties is approved by the supervisor, and where an unusual amount of help is required the approval of the District Engineer is secured.

2. FLOOD CONDITIONS ENCOUNTERED DURING 1926.—Exceptional flood conditions were encountered during the year 1926 in practically all parts of the State. Considerable damage was done to improved roads and bridges on the bond issue system causing a heavy expenditure of funds for repair and replacement.

Figure 39 shows a condition typical of others encountered during the season of 1926.

3. OUTLINE OF ACTIVITIES—1926.—During the calendar year 1926, the Bureau of Maintenance maintained 5,440 miles of surfaced roads consisting of the following:

Type.	Mileage.	Percent of Total.
Portland Cement Concrete	5,006.99	99.04
Bit. Concrete	48.18	.89
Brick	161.93	2.98
Bit. Macadam	25.85	.48
W. B. Macadam	36.73	.68
Gravel	160.32	2.93
	5,440.00	100.00

The work of maintaining these types consists of the repair of the pavement slab, filling of ruts and erosion in shoulders, cleaning of culverts and ditches, cutting weeds and vegetation, cleaning and clearing the right of way, repairing and replacement of route markers and safety signs, repair and replacement of guard fence, repair, cleaning and repainting of bridges, painting of traffic lines and removal of snow.

There was also under maintenance a total of 737.80 miles of detours, unpaved and temporary routes consisting of the following types and mileages:

Type.	Mileage.	Percent of Total
Gravel	125.83	17.05
Earth	568.00	76.99
Shale	1.38	.19
Macadam	7.54	1.02
Cinders	8.60	1.17
Oiled Earth	23.38	3.17
Miscellaneous	3.07	.41
	737.80	100.00

Detours and temporary routes are provided for the purpose of making connections between the paved routes thus permitting travel at all seasons of the year. Only sufficient maintenance is undertaken on these sections to make them passable.

Numerous authorizations were granted during 1926 for the construction of additions and betterments, consisting of the erection of new safety signs and route markers, widening of curves, construction of guard fence, curbs and gutters, new culverts, spillways, baffle walls, retaining walls and other items.

Complaints concerning drainage problems, entrance facilities and other conditions were investigated carefully and adjustments made where necessary.

Advice and information concerning maintenance methods were given cities, villages, counties and other states when requested.

4. PERMITS AND FRANCHISES.—Any property owner, corporation, public utility or other organization desiring to perform work of any nature within the limits of the right of way are required by law to obtain a permit for such work from the Bureau of Maintenance before such work can be done.

During 1926, 1,707 permits were granted covering construction of entrances to private properties, gasoline filling stations, lunch stands, telephone and telegraph lines, electric power transmission lines, water mains, cable conduits and sewers.

Personal investigations by the Engineer of Maintenance, District Engineer or their representatives are made to determine the desirability of issuing permits for these purposes. Before permits can be issued, plans are required showing the location of such construction and where special legal points are involved such cases are referred to the Attorney General's office for opinion before the work is authorized.

By means of these permits the Division of Highways is able to control the erection or establishment of such items within the right of way boundaries of the highways, and to prevent the encroachment of private interests or corporations on State property, thereby preserving the highways for highway purposes.

5. COST ACCOUNTING.—The system of cost accounts which was designed and installed during 1924 has been further perfected during 1926 with the result that it is now possible to make a complete analysis of costs of the various classes of work carried on by the Bureau of Maintenance by cost units and by the districts in which the work is located.

During 1926 a system was established making it possible to charge to the patrols in each maintenance section the expense which each patrolman incurs. A lack of uniformity in the method of making such charges existed and methods were so standardized as to enable the Bureau of Maintenance to obtain greater uniformity in their cost figures.

The following is a trial balance covering the transactions of the Bureau of Maintenance for the calendar year 1926:

TABLE XIII—TRIAL BALANCE COVERING TRANSACTIONS OF THE BUREAU OF MAITENANCE FOR THE CALENDAR YEAR 1926.

DEBITS.

Maintenance of Surface Roads—		
District No. 1 Patrol Costs	$408,700.21	
District No. 2 Patrol Costs	179,101.51	
District No. 3 Patrol Costs	172,485.54	
District No. 4 Patrol Costs	175,393.12	
District No. 5 Patrol Costs	227,636.33	
District No. 6 Patrol Costs	158,687.42	
District No. 7 Patrol Costs	140,713.87	
District No. 8 Patrol Costs	142,789.69	
District No. 9 Patrol Costs	121,326.00	
		$1,726,833.69
Maintenance of Detours—		
District No. 1 Patrol Costs	$23,498.82	
District No. 2 Patrol Costs	32,394.55	
District No. 3 Patrol Costs	27,325.04	
District No. 4 Patrol Costs	77,970.81	
District No. 5 Patrol Costs	5,417.18	
District No. 6 Patrol Costs	42,474.21	
District No. 7 Patrol Costs	17,735.92	
District No. 8 Patrol Costs	24,117.80	
District No. 9 Patrol Costs	55,696.30	
		$306,630.63
Construction of Additions and Betterments—		
District No. 1 Section Costs	$13,602.64	
District No. 2 Section Costs	3,775.81	
District No. 3 Section Costs	11,304.55	
District No. 4 Section Costs	26,576.10	
District No. 5 Section Costs	18,832.79	
District No. 6 Section Costs	8,701.80	
District No. 7 Section Costs	3,090.44	
District No. 8 Section Costs	7,729.27	
District No. 9 Section Costs	11,652.13	
		$105,265.53
Police Officers Costs		298,679.55
Police Officers Equipment		32,521.72
Maintenance, Machinery and Equipment		79,961.79
Sign and Post Shop Inventory		9,928.86
Maintenance Cash Refunds		37,236.42
Due from Counties for State Aid Maintenance		20,049.39
Bureau of Construction (Day Labor)		1,939.19
Bureau of Construction		709.17
Total Debits		$2,619,755.94

CREDITS.

Highway Maintenance Road Fund Fifty-fourth General Assembly	$2,265,822.58
Highway Construction Road Fund Fifty-fourth General Assembly	69,889.71
State Bond Road Fund 100M Fifty-fourth General Assembly	60,710.95
County State Aid Maintenance Appropriations	46,181.37
Allowance for Depreciation	68,893.84
Bureau of Machinery	97,144.88
Bureau of Construction (Day Labor)	617.72
Bureau of Materials	10,494.89
Total Credits	$2,619,755.94

The following graphic chart (Figure 40) shows the mileage of surfaced roads with percentages, also detour roads with percentages located in the various districts of the State:

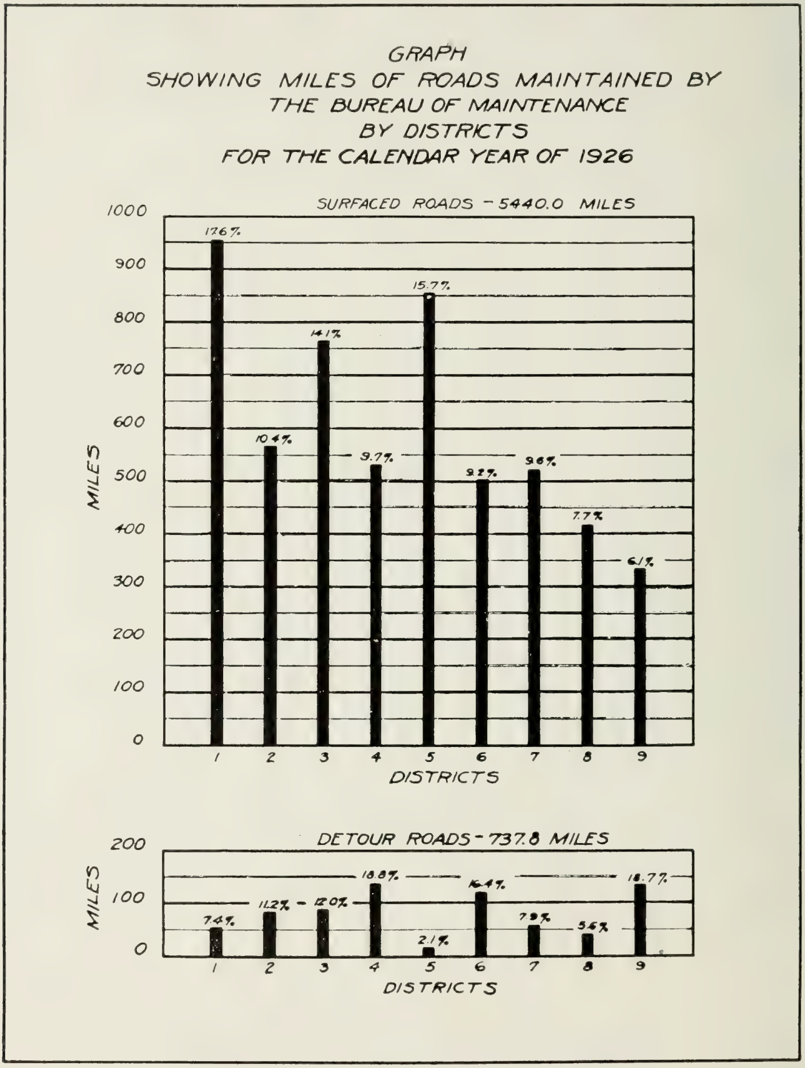


Figure 40.

The following graphic chart (Figure 41) shows the total cost of operations of the Bureau of Maintenance for the calendar year 1926 according to the activities carried on during that year:

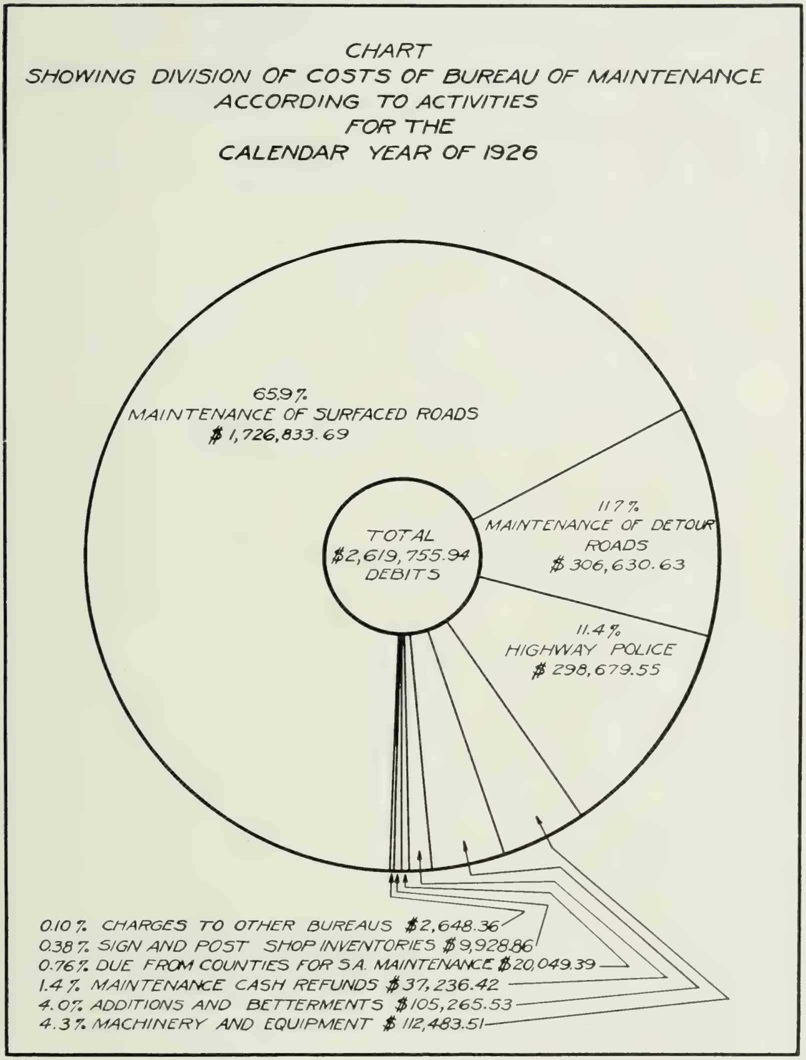


Figure 41.

The following graph (Figure 42) shows the sources from which funds were derived for carrying on the activities of the Bureau of Maintenance for the calendar year 1926:

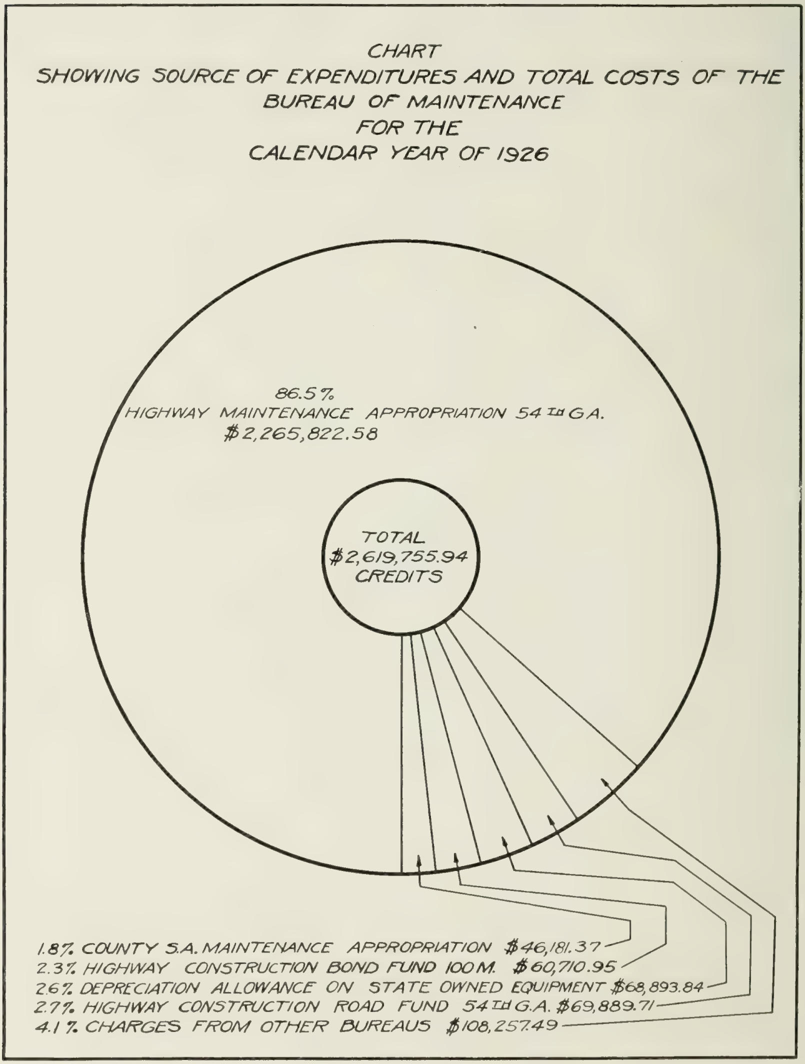


Figure 42.

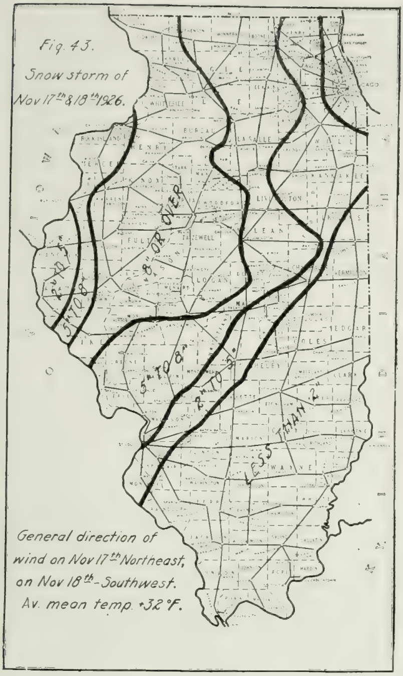


Fig. 43.

Snow storm of Nov 17th & 18th 1926.

General direction of wind on Nov 17th Northeast, on Nov 18th - Southwest. Av. mean temp. +32 °F.

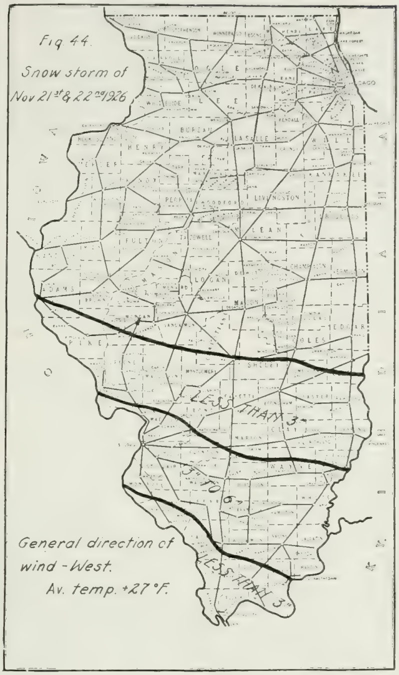


Fig. 44.

Snow storm of Nov 21st & 22nd 1926.

General direction of wind - West. Av. temp. +27 °F.

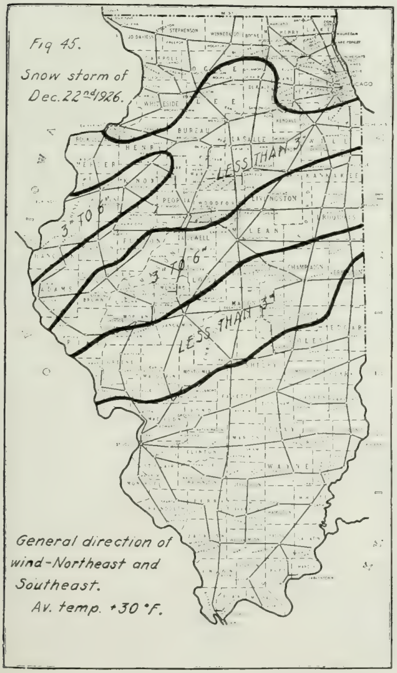


Fig. 45.

Snow storm of Dec. 22nd 1926.

General direction of wind - Northeast and Southeast. Av. temp. +30 °F.

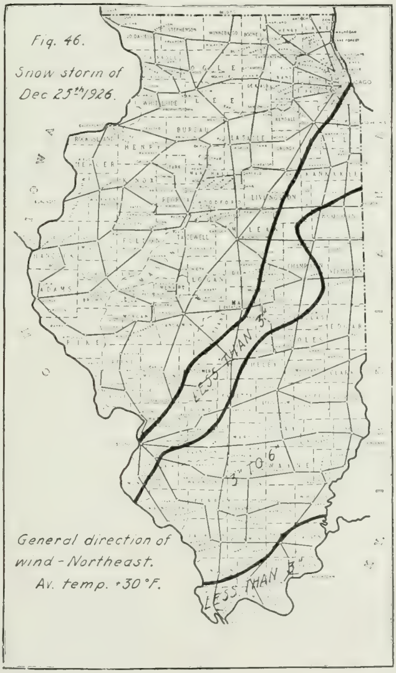


Fig. 46.

Snow storm of Dec 25th 1926.

General direction of wind - Northeast. Av. temp. +30 °F.

Figures 43, 44, 45 and 46.

6. SNOW REMOVAL.—The policy of keeping the main trunk highways of the State free from snow and open to traffic was found to be much more difficult to carry out in 1926 than during 1925. During 1926 there were four snow storms, varying in depth from three to eight inches, which caused considerable difficulty.

To keep the highways open some $26,000.00 of equipment was purchased which consisted of fifty-four V-type snow plows and four rotary plows. This equipment was in addition to that used during 1925.

Figures 43, 44, 45 and 46 show the districts affected by snowfalls during 1926.

Figure 47 shows typical snow conditions encountered during 1926.

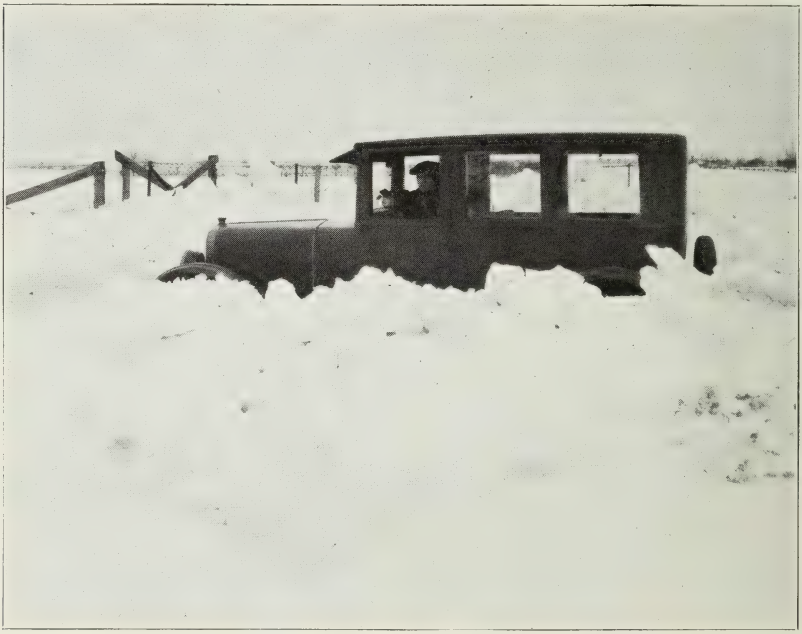


Figure 47.—A typical snow condition during 1926.

Owing to the variation of the snowfall in the various parts of the State and for the purpose of figuring the cost of snow removal it has been found advisable to divide the State into three zones; namely, the Northern zone covering the territory included in Districts 1, 2, 3 and 4, the Central zone covering the territory included in Districts 5 and 6 and the Southern zone comprising the territory included in Districts 7, 8 and 9.

Table XIV shows the cost of removing snow for these zones as well as cost for each district:

TABLE XIV—STATEMENT SHOWING COST OF SNOW REMOVAL FOR THE NORTHERN, CENTRAL AND SOUTHERN ZONES FOR THE CALENDAR YEAR 1926.

District number.	Weighted average mileage.	Labor hours.	Direct labor.	Direct expense.	Direct total cost.	Overhead expense.	Total cost.	Average cost per mile.
No. 1	749.76	52,213¼	$29,239.81	$4,619.41	$33,859.22	$20,165.05	$54,024.27	$72.06
No. 2	497.33	22,996	11,263.10	2,648.86	13,911.96	6,674.55	20,586.51	41.39
No. 3	616.52	16,303	9,481.33	3,025.13	12,506.46	9,221.44	21,727.90	35.24
No. 4	454.13	39,787¾	18,487.11	4,020.27	22,507.38	11,837.84	34,345.22	75.63
Total for Northern District	2,317.74	131,300	$68,471.35	$14,313.67	$82,785.02	$47,898.88	$130,683.90	$56.38
No. 5	497.74	6,546	$ 3,377.91	$ 877.82	$ 4,255.73	$3,190.94	$ 7,446.67	$14.96
No. 6	371.74	25,126½	13,357.58	2,421.93	15,779.51	8,817.71	24,597.22	66.17
Total for Central District	869.48	31,672½	$16,735.49	$3,299.75	$20,035.24	$12,008.65	$32,043.89	$36.85
No. 7	248.43	3,123	$1,577.99	$267.53	$1,845.52	$ 878.19	$2,723.71	$10.96
No. 8	260.15	8,710½	4,564.51	883.26	5,447.77	2,451.88	7,899.65	30.26
No. 9	194.98	3,207½	2,010.33	485.31	2,495.64	1,026.99	3,522.63	18.07
Total for Southern District	703.56	15,041	$8,152.83	$1,636.10	$9,788.93	$4,357.06	$14,145.99	$20.11
Total for entire State	3,890.78	178,013½	$93,359.67	$19,249.52	$112,609.19	$64,264.59	$176,873.78	$45.46

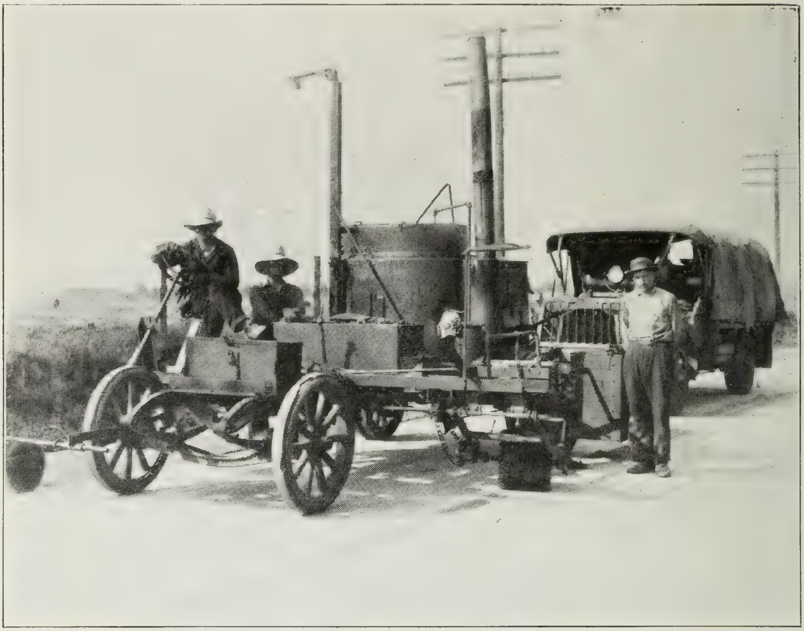


Figure 48.—Traffic line marking machine.

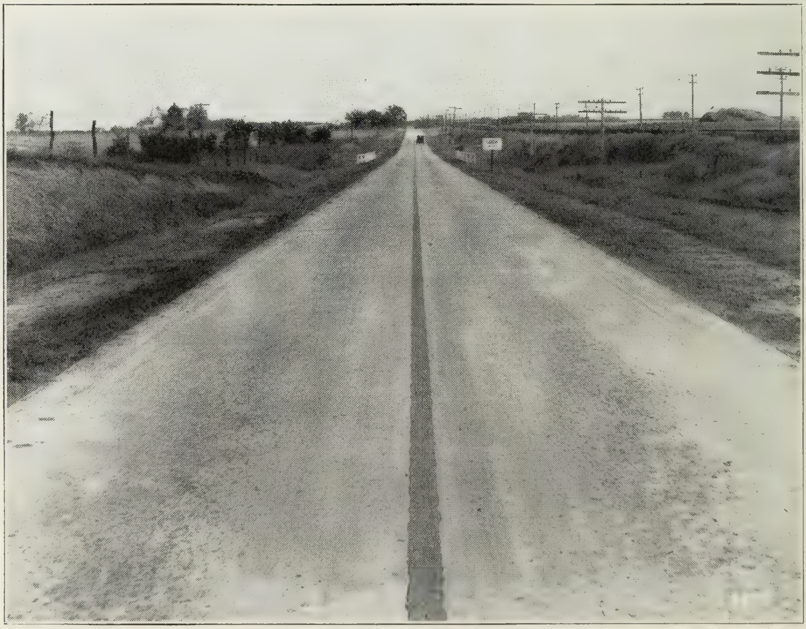


Figure 49.—View of State road showing center line made with the marking machine.

7. MAINTENANCE OF SURFACED ROADS.—

a. Organization—.Surfaced roads in each district are divided into patrols arranged by types. A number of patrols make a maintenance section which averages about nineteen miles in length which is a convenient mileage for a patrolman to take care of.

A number of maintenance sections, usually about six in number, are placed under the supervision of a supervising patrolman who is responsible to the District Maintenance Engineer. The District Maintenance Engineer is in general charge of all maintenance work in the district and is responsible to the District Engineer who in turn reports to the Engineer of Maintenance in Springfield.

b. Equipment.—Each patrolman is equipped with a truck, tar kettle, grader and such other small tools as may be necessary. He is held responsible for the keeping of his equipment in serviceable condition, and is required to report the condition of same periodically to his supervising patrolman.

c. Methods.—Where minor cracks and breaks have developed in the pavement they are generally repaired with asphalt, sand and gravel. Larger breaks are repaired with concrete, or with the same material as the original construction. Where depressions are encountered adjacent to bridges they are corrected by applying asphalt, gravel, stone or chips, or such defective places are removed entirely and replaced with new construction.

Ruts in the shoulders are filled with earth and dragged smooth, or, in the case of some of the heavier traveled roads, gravel, shale or crushed rock is placed along the edges of the pavement where excessive ruts have developed. Ditches and culverts are cleaned systematically to provide the necessary drainage. Weeds are cut and the shoulders mowed during the summer and fall seasons. Objectionable growths, such as bushes and limbs of trees, etc., are either removed or trimmed by the patrolman, usually during the winter months.

d. Traffic Line Marking.—For the purpose of guiding traffic and protecting the center construction joint, an asphalt traffic line is applied to the center of the pavement. This line is painted by machine, which has been developed and constructed by the Bureau of Maintenance. These machines have been perfected to such an extent that twenty miles of marking is easily accomplished in one day with an ordinary crew at an average cost of about $6.60 per mile including labor and material. Figure 48 is the type of machine used in this marking.

Figure 49 shows the center line made with the machine shown in Figure 48.

e. Route Markers and Safety Signs.—The type of route marker and safety sign which is being used in Illinois in marking the highways complies with the regulations adopted by the Federal Bureau of Public Roads and the American Association of State Highway Officials for the uniform marking of the principal highways of the United States.

All routes on the State Bond Issue system have been plainly marked with the route number placed within an outline map of the State of Illinois. Figure 50 shows the type of route marker used along the routes.

Telephone poles have also been marked along the routes at frequent intervals as an aid and guide to the traveling public. Figure 51 shows the type of telephone pole marking.

Routes through cities and villages have been marked with signs placed at convenient points inside the city limits indicating the direction and distance of prominent towns along such routes. Figure 53 shows the type of direction sign used inside of cities.

Figure 61 shows a type of stop sign used in marking all streets intersecting with State highways inside of city limits.

At the city limits of each town a marker is erected indicating the names of the principal cities and towns along the route and the mileage thereto. Figure 52 shows one of these markers.

At the city limits of each city or town a marker is erected showing the name of the city or town and its population. Figure 55 shows one of these markers.

At the junction of all State routes markers have been erected showing the number of the intersecting routes as well as markers indicating the names of principal towns and mileages along each route. Figures 58 and 54 shows the types of junction signs used.

Warning signs have also been erected at necessary points along the route to warn the public of various degrees of potential danger. These signs have been erected at a sufficient distance from the point of danger to warn the drivers to check the speed of their cars before reaching the indicated point. The signs indicate the degree of care to be exercised by the driver; the square or rectangular sign indicating a minimum degree of danger; a diamond shape sign indicating caution or an intermediate degree of danger and an octagonal sign indicating danger of a maximum degree. Figures 56, 57 and 60 show the type of signs used at these various points.

All approaches to railroad crossings are marked by diagonal black and white stripes on the pavement at an interval of 100 feet or a distance of 400 feet from the nearest rail. Figure 62 shows the type of pavement marking used at grade crossings.

At a distance of 400 feet from the railroad crossing a sign is erected indicating the name of the railroad and the degree of caution to be exercised before the crossing is reached. Figure 59 shows a typical railroad crossing sign.

Table XV shows the cost of marking through cities in the various districts for the calendar year 1926.

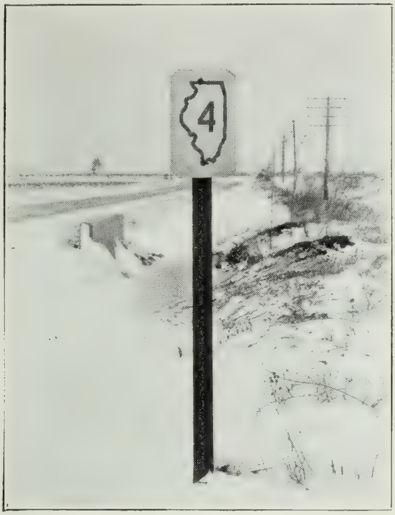


Figure 50.

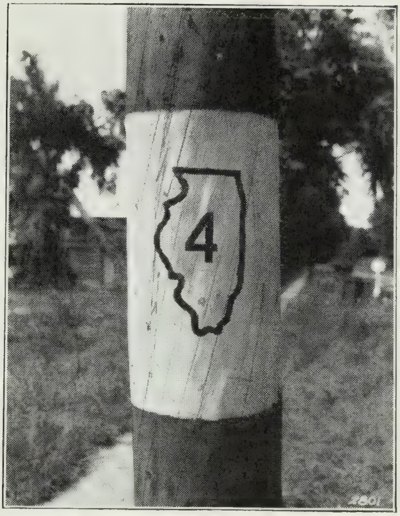


Figure 51.

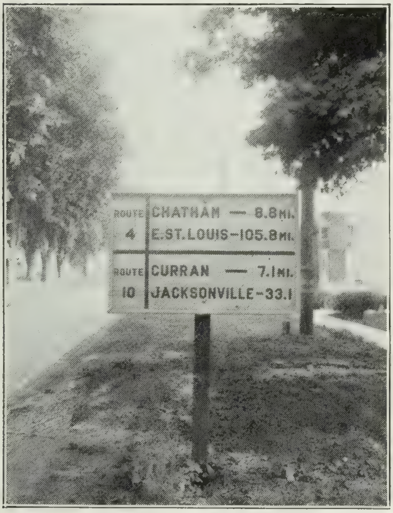


Figure 52.

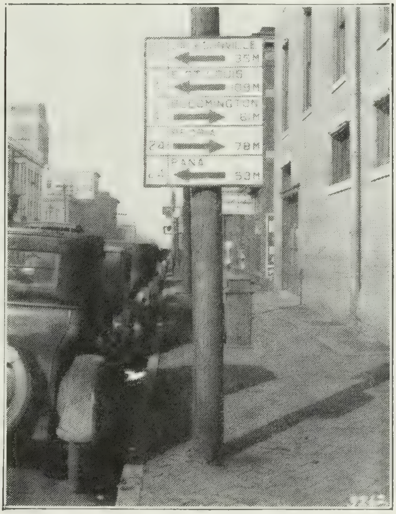


Figure 53.

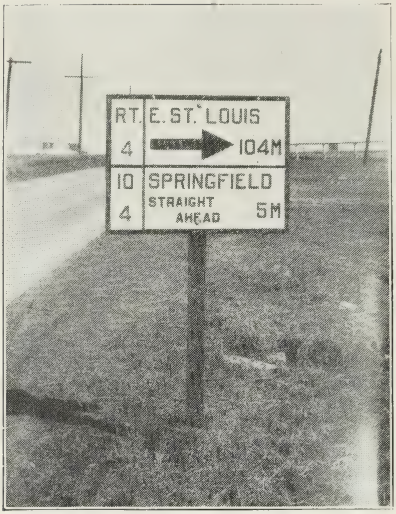


Figure 54.

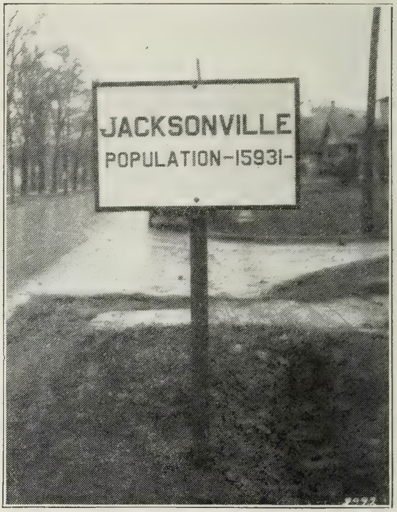


Figure 55.

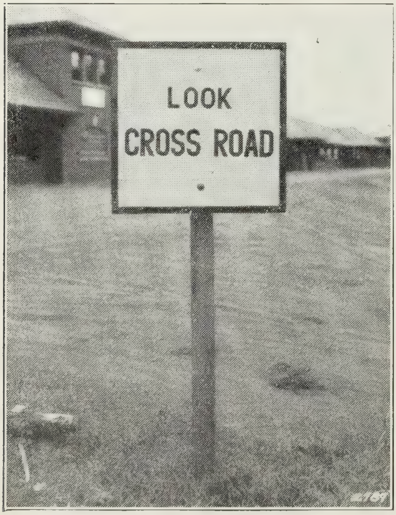


Figure 56.

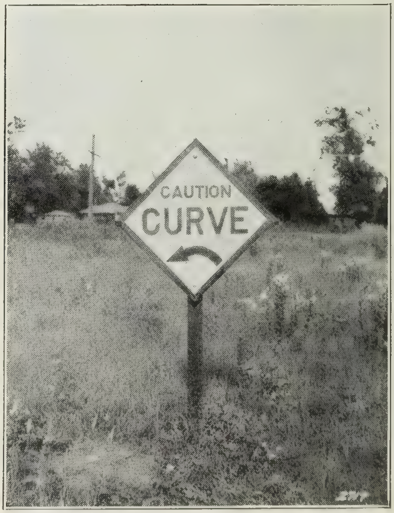


Figure 57.

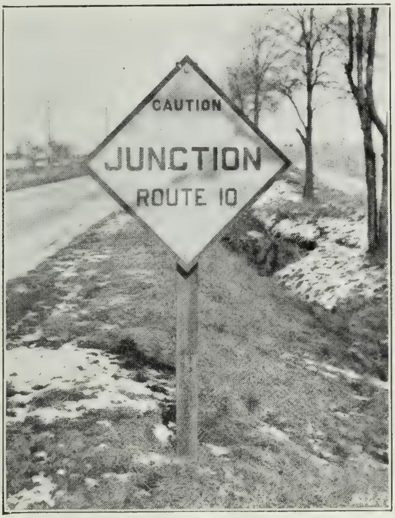


Figure 58.

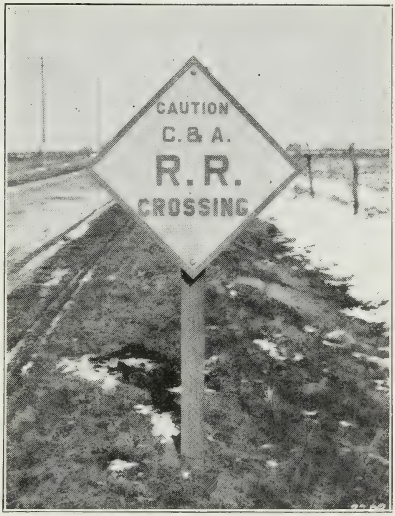


Figure 59.

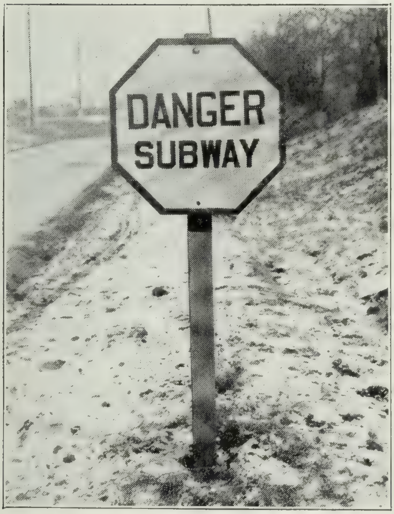


Figure 60.

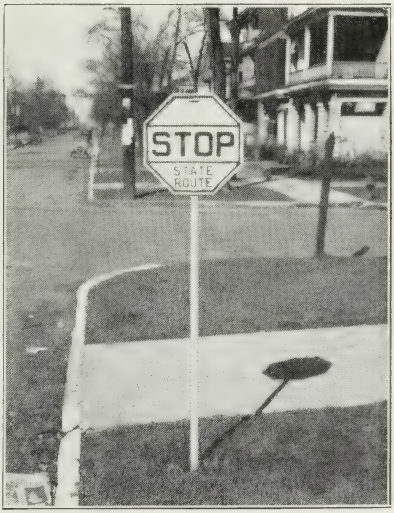


Figure 61.

TABLE XV—STATEMENT SHOWING COST OF MARKING ROUTES THROUGH CITIES IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

District.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.
No. 1	11,333½	$6,166.06	$1,503.91	$1,649.79	$9,319.76	$3,753.77	$13,073.53
No. 2	699	363.30		32.64	395.94	184.50	580.44
No. 3	705	359.50	3.00	22.61	385.11	279.44	664.55
No. 4	1,946½	799.12	9.90	40.92	849.94	519.12	1,369.06
No. 5	898	432.40			432.40	435.31	867.71
No. 6	596	278.10	54.25		332.35	187.21	519.56
No. 7	555	238.20			238.20	112.83	351.03
No. 8	982	536.00	2.09		538.09	225.32	763.41
No. 9	680	341.90	33.19	7.66	382.75	192.64	575.39
Total	18,395	$9,514.58	$1,606.34	$1,753.62	$12,874.54	$5,890.14	$18,764.68

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

Table XVI shows a comparison of mileages and costs on a per mile basis arranged by types and cost units for the calendar year 1926 for all classes of surfaced roads.

TABLE XVI—STATEMENT SHOWING COMPARISON OF MILEAGES AND COSTS ON PER MILE BASIS BY TYPES AND UNITS FOR THE CALENDAR YEAR 1926.

Account.	Portland cement concrete.	Brick.	Bituminous concrete.	Bituminous macadam.	Waterbound macadam.	Gravel.
Miles maintained	5,006.99	161.93	48.18	25.85	36.73	160.32
Maintenance of Wearing Surface—						
Paved surface	$65.15	$163.34	$570.98	$254.29	$127.63	$242.74
Upkeep of Roadside—						
Metal shoulders	$ 4.31	$ 9.95	----	$ .17	$ .40	----
Earth shoulders	84.83	106.96	$70.93	81.69	63.19	$ 5.08
Ditches and drains	17.31	23.63	15.97	3.99	16.25	17.15
Bridges and culverts	5.60	4.74	6.58	19.61	1.76	2.28
Markers and safety signs	16.90	11.02	26.04	2.46	1.00	.59
Guard fence	5.20	10.50	4.21	9.42	----	.61
Cutting and clearing vegetation	53.02	41.73	62.62	54.39	29.17	32.99
Cleaning traveled way	16.43	12.48	21.14	5.87	.99	2.68
Snow removal	33.81	26.76	31.62	19.87	6.32	5.05
Total upkeep	$237.41	$247.77	$239.11	$197.47	$119.08	$66.43
Total maintenance and upkeep	$302.56	$411.11	$810.09	$451.76	$246.71	$309.17

NOTE.—The costs per mile shown under bituminous macadam, waterbound macadam and gravel do not represent a fair average cost for maintenance and upkeep of such types due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

Table XVII shows a comparison of the amounts expended on the various types of surfaced roads during the calendar year 1926.

TABLE XVII—STATEMENT SHOWING COMPARISON OF MILES AND COST OF VARIOUS TYPES MAINTAINED DURING THE CALENDAR YEAR 1926.

Account.	Portland cement concrete.	Brick.	Bituminous concrete.	Bituminous macadam.	Waterbound macadam.	Gravel.	Total.
Miles maintained	5,006.99	161.93	48.18	25.85	36.73	160.32	5,440.00
Maintenance of Wearing Surface—							
Paved surface	$326,209.65	$26,449.90	$27,509.72	$6,573.47	$4,688.16	$38,916.30	$430,347.20
Upkeep of Roadside—							
Metal shoulders	$ 21,577.74	$ 1,612.34		$ 4.45	$ 14.54		$ 23,209.07
Earth shoulders	424,714.07	17,321.27	$3,417.69	2,111.70	2,321.09	$ 814.35	450,700.17
Ditches and drains	86,664.92	3,825.94	769.59	103.05	596.94	2,750.01	94,710.45
Bridges and culverts	28,041.08	767.15	316.92	506.98	64.70	365.67	30,062.50
Markers and safety signs	84,613.86	1,784.29	1,254.76	63.68	36.79	94.72	87,848.10
Guard fence	26,059.11	1,701.85	202.63	243.43		98.32	28,305.34
Cutting and clearing vegetation	265,508.09	6,756.45	3,016.83	1,405.97	1,071.00	5,288.19	283,046.53
Cleaning traveled way	82,286.87	2,020.71	1,018.20	151.71	36.44	429.86	85,943.79
Snow removal	169,248.58	4,331.41	1,523.46	513.51	232.33	808.97	176,658.26
Total upkeep	$1,188,714.32	$40,121.41	$11,520.08	$5,104.48	$4,373.83	$10,650.09	$1,260,484.21
Total maintenance and upkeep cost	$1,514,923.97	$66,571.31	$39,029.80	$11,677.95	$9,061.99	$49,566.39	$1,690,831.41

Table XVIII shows the number of patrols and miles of various types of surfaced roads located in the various districts of the State.

TABLE XVIII—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF SURFACED ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1926 IN ALL DISTRICTS.

Districts.	Portland cement concrete.		Brick.		Bituminous concrete.		Bituminous macadam.		Waterbound macadam.		Gravel.		Bridge patrols.	Bridges—100 foot span or over.	Total.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.			Patrols.	Miles.
No. 1	155	875.83	3	2.42	16	48.18	2	9.15	6	16.62	2	4.39	28	28	212	956.59
No. 2	59	476.33	4	11.19			4	7.61	3	4.28	13	65.52	19	21	102	564.93
No. 3	82	722.77	9	6.94			2	1.79	1	2.00	6	30.56	23	25	123	764.06
No. 4	79	513.24	8	14.67							1	.51	18	18	106	528.42
No. 5	84	757.56	28	80.70							5	15.52	22	23	139	853.78
No. 6	56	480.67	8	10.66			2	2.53	2	7.25			8	8	76	501.11
No. 7	59	501.31	4	9.20					1	1.93	6	8.95	4	4	74	521.39
No. 8	52	388.25	5	16.95			1	2.07	3	4.65	2	5.03	18	18	81	416.95
No. 9	34	291.03	2	9.20			2	2.70			6	29.84	20	21	64	332.77
Total	660	5,006.99	71	161.93	16	48.18	13	25.85	16	36.73	41	160.32	160	166	977	5,440.00

Tables XIX to XXIV inclusive, show the consolidated cost of maintenance and upkeep of the various types of surfaced roads under maintenance during the calendar year 1926.

TABLE XIX—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 5,006.99 MILES OF CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	279, 197	$136, 789.47	$70, 442.48	$30, 747.30	$237, 979.25	$88, 633.07	$326, 612.32	$65.23
Upkeep of Roadside—								
Metal shoulders	17, 169	$ 8, 550.49	$4, 051.70	$ 2, 690.97	$ 15, 293.16	$ 6, 284.58	$ 21, 577.74	$ 4.31
Earth shoulders	452, 377	222, 854.97	7, 380.89	51, 797.02	282, 032.88	142, 681.19	424, 714.07	84.83
Ditches and drains	93, 246	45, 853.01	1, 133.84	10, 546.35	57, 533.20	29, 131.72	86, 664.92	17.31
Bridges and culverts	27, 207	13, 475.62	2, 314.18	2, 840.10	18, 629.90	9, 008.51	27, 638.41	5.52
Markers and safety signs	83, 848	45, 325.35	4, 205.65	9, 149.12	58, 680.12	25, 933.74	84, 613.86	16.90
Guard fence	21, 436	10, 254.92	6, 904.95	2, 329.79	19, 489.66	6, 569.45	26, 059.11	5.20
Cutting and clearing vegetation	295, 220	157, 846.57	----------	25, 051.26	182, 897.83	82, 610.26	265, 508.09	53.02
Cleaning traveled way	81, 646	43, 400.20	----------	10, 244.45	53, 644.65	28, 642.22	82, 286.87	16.43
Snow removal	170, 616	89, 328.28	----------	18, 405.57	107, 733.85	61, 514.73	169, 248.58	33.81
Total upkeep	1, 242, 765	$636, 889.41	$25, 991.21	$133, 054.63	$795, 935.25	$392, 376.40	$1,188,311.65	$237.33
Total maintenance and upkeep costs	1, 521, 962	$773, 678.88	$96, 433.69	$163, 801.93	$1,033,914.50	$481, 009.47	$1,514,923.97	$302.56

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* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE XX—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 161.93 MILES OF BRICK ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	24,267	$11,152.75	$6,215.01	$1,803.40	$19,171.16	$7,278.74	$26,449.90	$163.34
Upkeep of Roadside—								
Metal shoulders	1,235	$ 611.74	$332.77	$ 171.53	$ 1,116.04	$ 496.30	$ 1,612.34	$ 9.95
Earth shoulders	18,071	8,823.50	323.95	2,021.64	11,169.09	6,152.18	17,321.27	106.96
Ditches and drains	3,972	1,898.35	44.66	502.44	2,445.45	1,380.49	3,825.94	23.63
Bridges and culverts	703	324.63	99.70	90.33	514.66	252.49	767.15	4.74
Markers and safety signs	1,912	924.64	98.48	197.73	1,220.85	563.44	1,784.29	11.02
Guard fence	1,267	618.36	469.67	126.99	1,215.02	486.83	1,701.85	10.50
Cutting and clearing vegetation	7,429	3,880.31		640.22	4,520.53	2,235.92	6,756.45	41.73
Cleaning traveled way	1,986	1,046.13		326.68	1,372.81	647.90	2,020.71	12.48
Snow removal	4,377	2,193.77		440.91	2,634.68	1,696.73	4,331.41	26.76
Total upkeep	40,952	$20,321.43	$1,369.23	$4,518.47	$26,209.13	$13,912.28	$40,121.41	$247.77
Total maintenance and upkeep cost	65,219	$31,474.18	$7,584.24	$6,321.87	$45,380.29	$21,191.02	$66,571.31	$411.11

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XXI—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 48.18 MILES OF BITUMINOUS CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	17, 187	$11, 599.12	$7, 451.56	$2, 539.25	$21, 589.93	$5, 919.79	$27, 509.72	$570.98
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	3, 290	$1, 850.23	$22.88	$461.12	$2, 334.23	$1, 083.46	$3, 417.69	$70.93
Ditches and drains	935	474.69		67.31	542.00	227.59	769.59	15.97
Bridges and culverts	260	143.43	35.70	39.29	218.42	98.50	316.92	6.58
Markers and safety signs	838	807.01	89.40	114.43	1, 010.84	243.92	1, 254.76	26.04
Guard fence	188	94.90	25.47	12.04	132.41	70.22	202.63	4.21
Cutting and clearing vegetation	3, 356	1, 985.05		206.59	2, 191.64	825.19	3, 016.83	62.62
Cleaning traveled way	994	544.41		141.93	688.34	331.86	1, 018.20	21.14
Snow removal	1, 239	874.24		171.93	1, 046.17	477.29	1, 523.46	31.62
Total upkeep	11, 100	$6, 773.96	$173.45	$1, 214.64	$8, 162.05	$3, 358.03	$11, 520.08	$239.11
Total maintenance and upkeep cost	28, 287	$18, 373.08	$7, 625.01	$3, 753.89	$29, 751.98	$9, 277.82	$39, 029.80	$810.09

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* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE XXII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 25.85 MILES OF BITUMINOUS MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	4,433	$2,130.14	$2,965.16	$292.83	$5,388.13	$1,185.34	$6,573.47	$254.29
Upkeep of Roadside—								
Metal shoulders	4	$ 2.80			$ 2.80	$ 1.65	$ 4.45	$ .17
Earth shoulders	2,438	1,275.65		$129.10	1,404.75	706.95	2,111.70	81.69
Ditches and drains	114	58.75		11.96	70.71	32.34	103.05	3.99
Bridge and culverts	202	199.16	$219.21	32.18	450.55	56.43	506.98	19.61
Markers and safety signs	75	38.64		2.99	41.63	22.05	63.68	2.46
Guard fence	309	143.79		17.14	160.93	82.50	243.43	9.42
Cutting and clearing vegetation	1,540	839.58		131.47	971.05	434.92	1,405.97	54.39
Cleaning traveled way	164	84.10		12.94	97.04	54.67	151.71	5.87
Snow removal	484	258.48		93.05	351.53	161.98	513.51	19.87
Total upkeep	5,330	$2,900.95	$219.21	$430.83	$3,550.99	$1,553.49	$5,104.48	$197.47
Total maintenance and upkeep cost	9,763	$5,031.09	$3,184.37	$723.66	$8,939.12	$2,738.83	$11,677.95	$451.76

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under bituminous macadam do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE XXIII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 36.73 MILES OF WATERBOUND MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	3,402	$1,788.97	$1,365.53	$517.20	$3,671.70	$1,016.46	$4,688.16	$127.63
Upkeep of Roadside—								
Metal shoulders	18	$ 9.18	----------	----------	$ 9.18	$ 5.36	$ 14.54	$ .40
Earth shoulders	2,652	1,327.86	----------	$254.20	1,582.06	739.03	2,321.09	63.19
Ditches and drains	597	327.21	----------	60.77	387.98	208.96	596.94	16.25
Bridges and culverts	76	36.94	----------	8.45	45.39	19.31	64.70	1.76
Markers and safety signs	25	12.84	----------	15.04	27.88	8.91	36.79	1.00
Guard fence	----------	----------	----------	----------	----------	----------	----------	----------
Cutting and clearing vegetation	1,248	646.11	----------	123.95	770.06	300.94	1,071.00	29.17
Cleaning traveled way	33	18.05	----------	7.70	25.75	10.69	36.44	.99
Snow removal	222	125.06	----------	25.93	150.99	81.34	232.33	6.32
Total upkeep	4,871	$2,503.25	----------	$496.04	$2,999.29	$1,374.54	$4,373.83	$119.08
Total maintenance and upkeep cost	8,273	$4,292.22	$1,365.53	$1,013.24	$6,670.99	$2,391.00	$9,061.99	$246.71

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under waterbound macadam do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE XXIV—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 160.32 MILES OF GRAVEL ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	28,412	$15,635.31	$12,173.42	$2,517.05	$30,325.78	$8,590.52	$38,916.30	$242.74
Upkeep of Roadside—								
Earth shoulders	828	$ 411.99		$125.05	$ 537.04	$ 277.31	$ 814.35	$ 5.08
Ditches and drains	2,473	1,216.18	$346.15	380.69	1,943.02	806.99	2,750.01	17.15
Bridges and culverts	393	195.04	3.50	53.86	252.40	113.27	365.67	2.28
Markers and safety signs	101	51.70	4.80	7.65	64.15	30.57	94.72	.59
Guard fence	86	42.02	6.80	23.97	72.79	25.53	98.32	.61
Cutting and clearing vegetation	5,883	3,122.45		490.69	3,613.14	1,675.05	5,288.19	32.99
Cleaning traveled way	341	177.86		102.62	280.48	149.38	429.86	2.68
Snow removal	848	462.78		94.69	557.47	251.50	808.97	5.05
Total upkeep	10,953	$5,680.02	$361.25	$1,279.22	$7,320.49	$3,329.60	$10,650.09	$66.43
Total maintenance and upkeep cost	39,365	$21,315.33	$12,534.67	$3,796.27	$37,646.27	$11,920.12	$49,566.39	$309.17

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under Gravel do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

Figure 63 shows the percentage of mileage of various types of surfaced roads under maintenance in the various districts for the calendar year 1926.

Figure 64 shows the total cost of maintenance of all surfaced roads for the calendar year 1926 according to classifications under which costs were collected.

8. MAINTENANCE OF LARGE BRIDGES.—Separate patrols have been created for all large bridges of 100 foot span or over. Table XXV shows the number of such bridges located in the various districts, the cost of maintenance and upkeep of same for the calendar year 1926 with the average cost per bridge per district.

9. MAINTENANCE OF DETOURS, UNPAVED AND TEMPORARY ROUTES.—

a. Orgaization.—An organization for the maintenance of detours, unpaved and temporary routes has been perfected which is similar to that used for the maintenance of surfaced roads.

These detours are under the charge of a patrolman who is responsible for the maintenance of the traveled way and for the upkeep of markers and safety signs. Only sufficient funds are expended on such routes to make them passable during all seasons of the year without undue hardship. The patrolman in charge of this work reports to a supervisor who is responsible to the District Maintenance Engineer.

The patrolmen who are employed to do this work are paid on an hourly or monthly basis depending on the amount and kind of work needed on each patrol and the traffic conditions encountered.

b. Equipment.—Each patrolman is required to furnish a team. A light patrol grader and miscellaneous small tools required are furnished by the Department.

c. Methods.—Only such funds are expended for the maintenance of detours and temporary routes as may be necessary to care for the traffic in a satisfactory manner. As soon as the construction work is completed, which the detour is serving, the pavement is thrown open to traffic and the detour or temporary route is abandoned.

d. Route Markers and Safety Signs.—As a guide to the traveling public all detours and temporary routes are marked at convenient points with the standard route marking and safety signs used on surfaced roads.

Figure 65 shows the mileage of detours and temporary routes maintained during the calendar year 1926 with the mileage of each type and percentage of total.

Figure 66 shows the cost of maintenance of all detours and temporary routes for the calendar year 1926.

Table XXVI is a consolidated statement of the cost of maintenance and upkeep of all types of detours and temporary routes for the calendar year 1926.

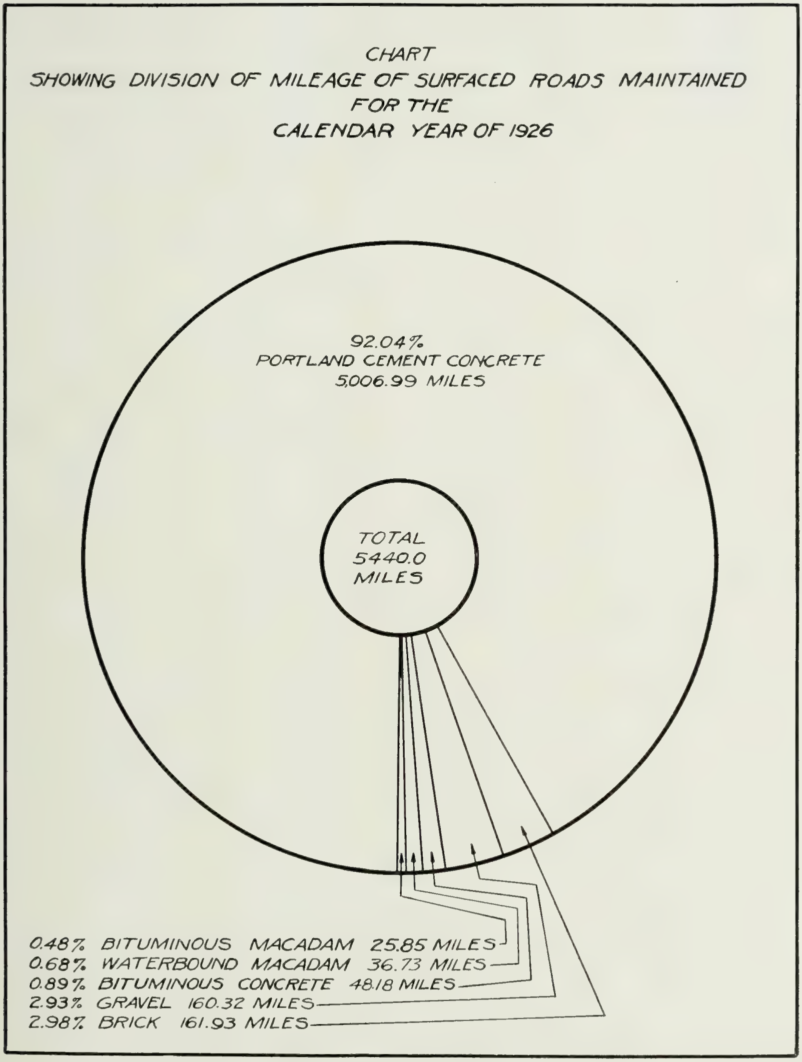
CHART
SHOWING DIVISION OF MILEAGE OF SURFACED ROADS MAINTAINED
FOR THE
CALENDAR YEAR OF 1926
92.04%
PORTLAND CEMENT CONCRETE
5006.99 MILES
TOTAL
5440.0
MILES
0.48% BITUMINOUS MACADAM 25.85 MILES
0.68% WATERBOUND MACADAM 36.73 MILES
0.89% BITUMINOUS CONCRETE 48.18 MILES
2.93% GRAVEL 160.32 MILES
2.98% BRICK 161.93 MILES

Figure 63.

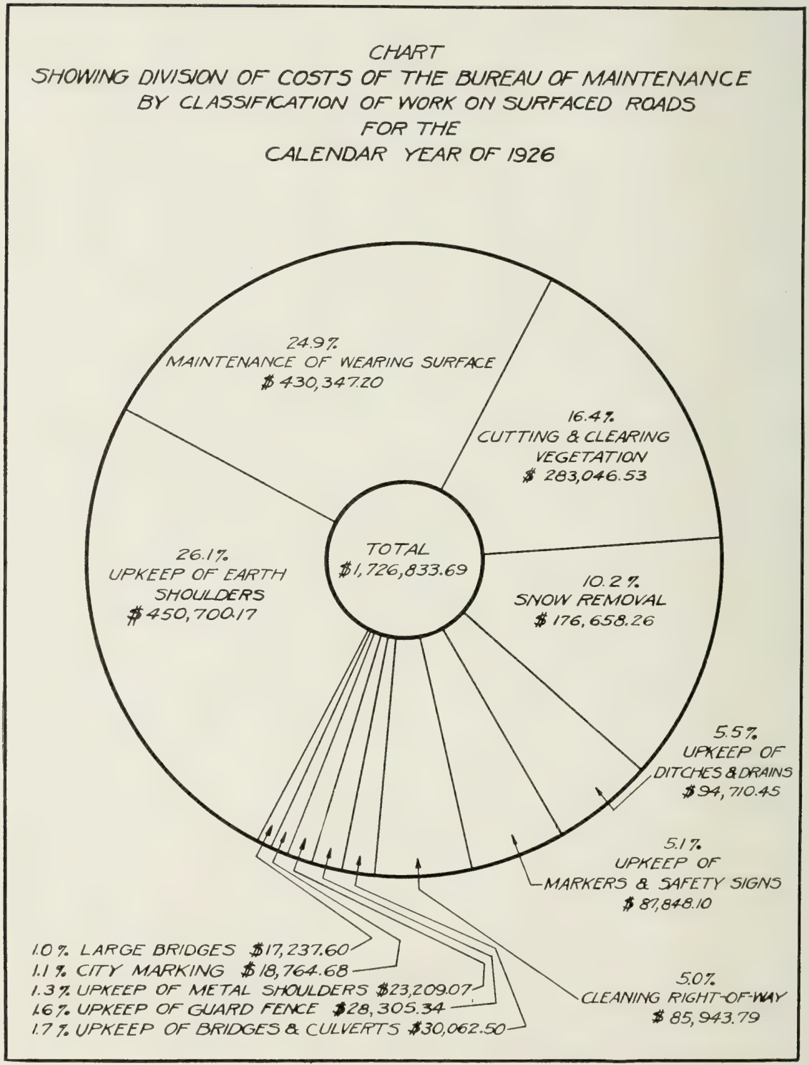

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Figure 64.

TABLE XXV—STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF BRIDGES OVER 100 FOOT SPAN (LOCATED IN THE VARIOUS DISTRICTS FOR THE CALENDAR YEAR 1926).

District.	Number of bridges.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per bridge.
No. 1	28	1,033	$ 543.36	$ 42.18	$ 41.40	$ 626.94	$ 334.15	$ 961.09	$ 34.32
No. 2	21	969	580.75	826.97	83.79	1,491.51	260.69	1,752.20	83.44
No. 3	25	3,796	1,889.80	658.12	110.72	2,658.64	1,524.66	4,183.30	167.33
No. 4	18	1,249	638.22	378.95	184.43	1,201.60	346.20	1,547.80	85.99
No. 5	23	1,967	929.22	319.89	193.21	1,442.32	757.44	2,199.76	95.64
No. 6	8	251	122.02	----------	11.75	133.77	86.22	219.99	27.50
No. 7	4	2,376½	978.25	634.91	107.16	1,720.32	467.26	2,187.58	546.90
No. 8	18	154	73.69	11.00	56.59	141.28	41.69	182.97	10.17
No. 9	21	5,082	2,525.45	6.10	297.95	2,829.50	1,173.41	4,002.91	190.61
Total	166	16,877½	$8,280.76	$2,878.12	$1,087.00	$12,245.88	$4,991.72	$17,237.60	$103.84

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

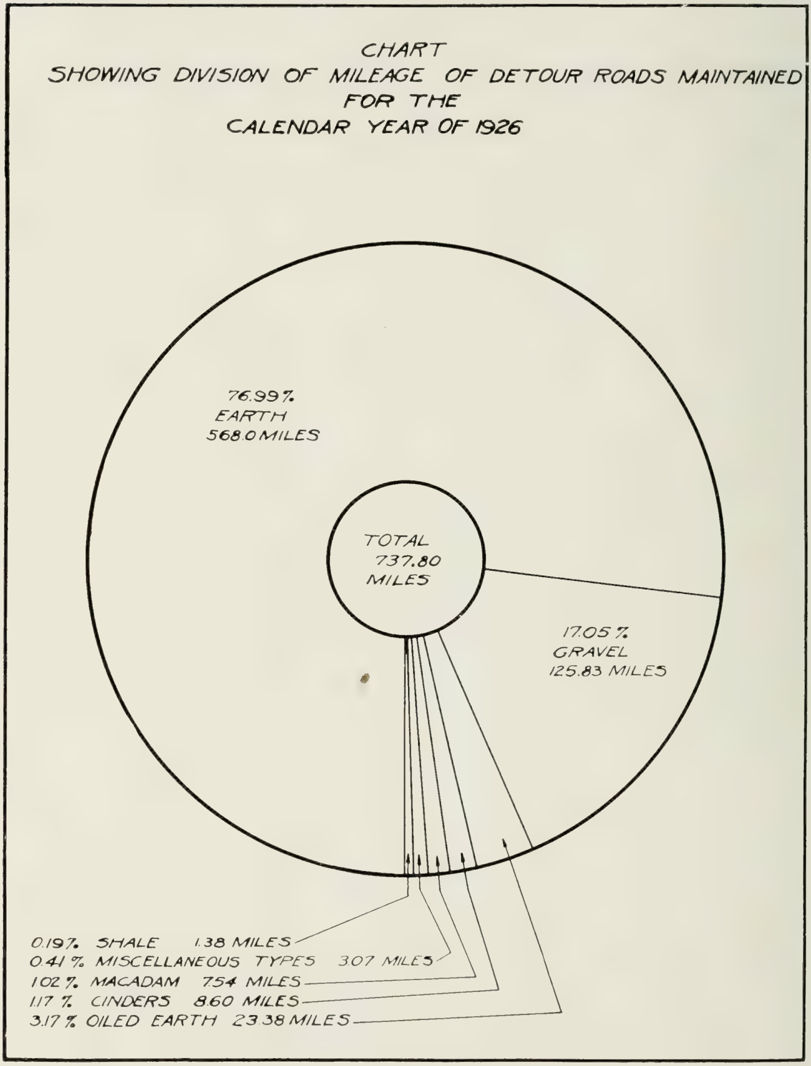

CHART
SHOWING DIVISION OF MILEAGE OF DETOUR ROADS MAINTAINED
FOR THE
CALENDAR YEAR OF 1926

Figure 65.

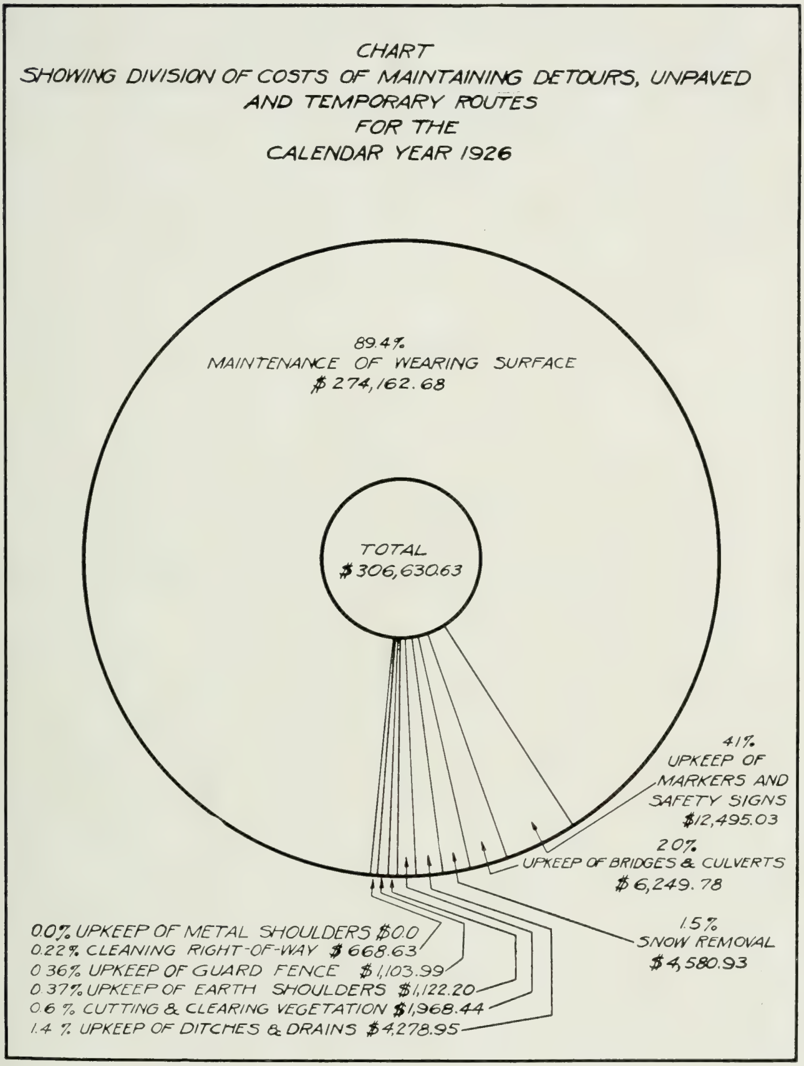
CHART
SHOWING DIVISION OF COSTS OF MAINTAINING DETOURS, UNPAVED AND TEMPORARY ROUTES FOR THE CALENDAR YEAR 1926
89.4%
MAINTENANCE OF WEARING SURFACE
$274,162.68
TOTAL
$306,630.63
4.1%
UPKEEP OF MARKERS AND SAFETY SIGNS
$12,495.03
2.0%
UPKEEP OF BRIDGES & CULVERTS
$6,249.78
1.5%
SNOW REMOVAL
$4,580.93
0.0% UPKEEP OF METAL SHOULDERS $0.0
0.22% CLEANING RIGHT-OF-WAY $668.63
0.36% UPKEEP OF GUARD FENCE $1,103.99
0.37% UPKEEP OF EARTH SHOULDERS $1,122.20
0.6 % CUTTING & CLEARING VEGETATION $1,968.44
1.4 % UPKEEP OF DITCHES & DRAINS $4,278.95

Figure 66.

TABLE XXVI—CONSOLIDATED STATEMENT SHOWING THE COST OF MAINTENANCE AND UPKEEP ON ALL TYPES OF DETOURS, UNPAVED AND TEMPORARY ROUTES FOR THE CALENDAR YEAR 1926.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.
Maintenance of Wearing Surface—							
Paved surface	259,923	$158,877.01	$18,456.18	$16,620.97	$193,954.16	$80,208.52	$274,162.68
Upkeep of Roadside—							
Metal shoulders							
Earth shoulders	1,348	$ 645.85	$ 25.00	$ 94.24	$ 765.09	$ 357.11	$ 1,122.20
Ditches and drains	5,018½	2,555.20	46.06	210.49	2,811.75	1,467.20	4,278.95
Bridges and culverts	5,622	3,436.92	974.50	231.45	4,642.87	1,606.91	6,249.78
Markers and safety signs	13,626	6,452.83	411.58	1,231.54	8,095.95	4,399.08	12,495.03
Guard fence	957	435.43	234.46	103.01	772.90	331.09	1,103.99
Cutting and clearing vegetation	2,622½	1,241.73		147.53	1,389.26	579.18	1,968.44
Cleaning traveled way	788	380.53		40.29	420.82	247.81	668.63
Snow removal	4,813½	2,734.90		314.20	3,049.10	1,531.83	4,580.93
Total upkeep	34,795½	$17,883.39	$1,691.60	$2,372.75	$21,947.74	$10,520.21	$32,467.95
Total maintenance and upkeep cost	294,718½	$176,760.40	$20,147.78	$18,993.72	$215,901.90	$90,728.73	$306,630.63

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

Table XXVII shows the number of patrols and mileages of the various types of detours and temporary routes located in the various districts which were under maintenance during the calendar year 1926.

TABLE XXVII—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF DETOUR ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1926 IN ALL DISTRICTS.

Districts.	Earth.		Gravel.		Cinders.		Shale.		Macadam.		Oiled earth.		Miscellaneous.		Total.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1	1	.66	31	53.09	2	.09			5	.93			2		41	54.77
No. 2	26	71.26	5	9.34					2	2.20					33	82.80
No. 3	16	72.65	11	8.90					7	3.25	1	2.50	4	1.05	39	88.35
No. 4	35	123.94	10	13.06	4	.85							1	.66	50	138.51
No. 5											9	14.73	1	.56	10	15.29
No. 6	21	108.22	6	4.90	1	.15	3	1.38			1	6.15			32	120.80
No. 7	16	32.84	13	23.86	4	1.23									33	57.93
No. 8	11	33.96	3	.70	7	5.99			1	.66					22	41.31
No. 9	27	124.47	5	11.98	1	.29			1	.50			1	.80	35	138.04
Total	153	568.00	84	125.83	19	8.60	3	1.38	16	7.54	11	23.38	9	3.07	295	737.80

e. Maintenance of Gaps.—Gaps left in the pavement for grade separations or settlement of heavy fills are surfaced with stone, gravel, shale, cinders or some other suitable material in order to make them passable at all seasons of the year.

10. ADDITIONS AND BETTERMENTS.—Very frequently conditions will arise after the original construction has been completed whereby it is found necessary to construct new culverts, baffle walls, retaining walls, curb and gutter sections or to widen the pavement on curves, erect new route markers or safety signs or otherwise to improve the existing roads. These items are paid from construction funds since they are considered permanent improvements to the roads already built. In order to control the construction of these items and the funds involved, the District Engineers have been required to secure an authorization for the contemplated work showing the location and description of such work together with an estimate of its cost before the work is permitted to be done or the funds expended. The cost of such improvements is carried entirely separate from maintenance costs.

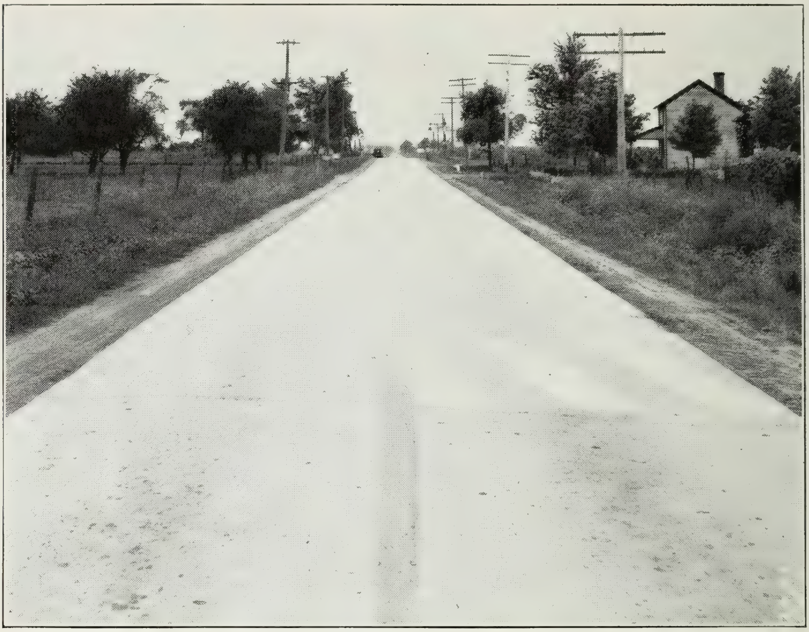

Figure 62.

Table XXVIII represents the amounts spent in each district for such purposes during the calendar year 1926.

TABLE XXVIII—STATEMENT SHOWING AMOUNTS EXPENDED FOR ADDITIONS AND BETTERMENTS DURING THE CALENDAR YEAR 1926.

District.	Total Cost.	District.	Total Cost.
No. 1	$13,602.64	No. 7	3,090.44
No. 2	3,775.81	No. 8	7,729.27
No. 3	11,304.55	No. 9	11,652.13
No. 4	26,576.10		
No. 5	18,832.79	Total	$105,265.53
No. 6	8,701.80		

11. POLICING OF THE STATE HIGHWAY SYSTEM.—

a. Organization and Duties.—For the enforcement of the motor vehicle act and to prevent the excessive expenditure of funds which overloaded trucks would cause, a highway patrol organization has been organized and consists of one chief, twelve sergeants, 109 patrol officers and five mechanics. Their duties are to weigh trucks, warn speeders, arrest drunken and reckless drivers and recover stolen cars.

b. Equipment.—Each sergeant is equipped with a car while the patrol officers are furnished with motorcycle and side car and a set of portable scales for weighing trucks. Uniforms are furnished by the Division of Highways.

c. Work Accomplished.—Table XXIX shows the work accomplished by this force during the calendar year 1926:

TABLE XXIX—ANNUAL REPORT OF STATE HIGHWAY PATROL OFFICERS FOR THE YEAR 1926.

ARRESTS.

Assault	1	Licenses (chauffeur's)	43
Bank robberies	3	Leaving scene of accident	22
Blocking traffic	18	Leaving motor running	7
Concealed weapons	8	Murderers captured	3
Defacing engine numbers	2	Manslaughter	5
Defective tires	21	No mirror	43
Defective brakes	4	Overwidth	3
Disorderly conduct	78	Racing on highway	6
Failing to stop on entering highway	49	Reckless driving	323
		Resisting arrest	1
Forgery	8	Speed control devices	11
Intoxicated Drivers	269	Stealing cars	102
Injuring pavement	14	Speeding passenger cars	553
Impersonating an officer	7	Speeding Busses	60
Larceny	128	Speeding trucks	175
Lights (none)	201	Transporting liquor	9
Lights (Bright)	82	Trucks overweight	489
Licenses (none)	168	Whistles, gongs and bells	16
Licenses (fictitious)	278		
Total arrests for 1926			3,210

OTHER ACTIVITIES.

Speeders warned	14,645
Stolen cars recovered	221
Trucks weighed	5,368
Mileage covered by officers	1,393,843
Mileage covered by sergeants	182,312

Figure 67 shows the cost of maintaining this force for the calendar year 1926.

Figure 68 shows a highway patrol officer weighing an overloaded truck.

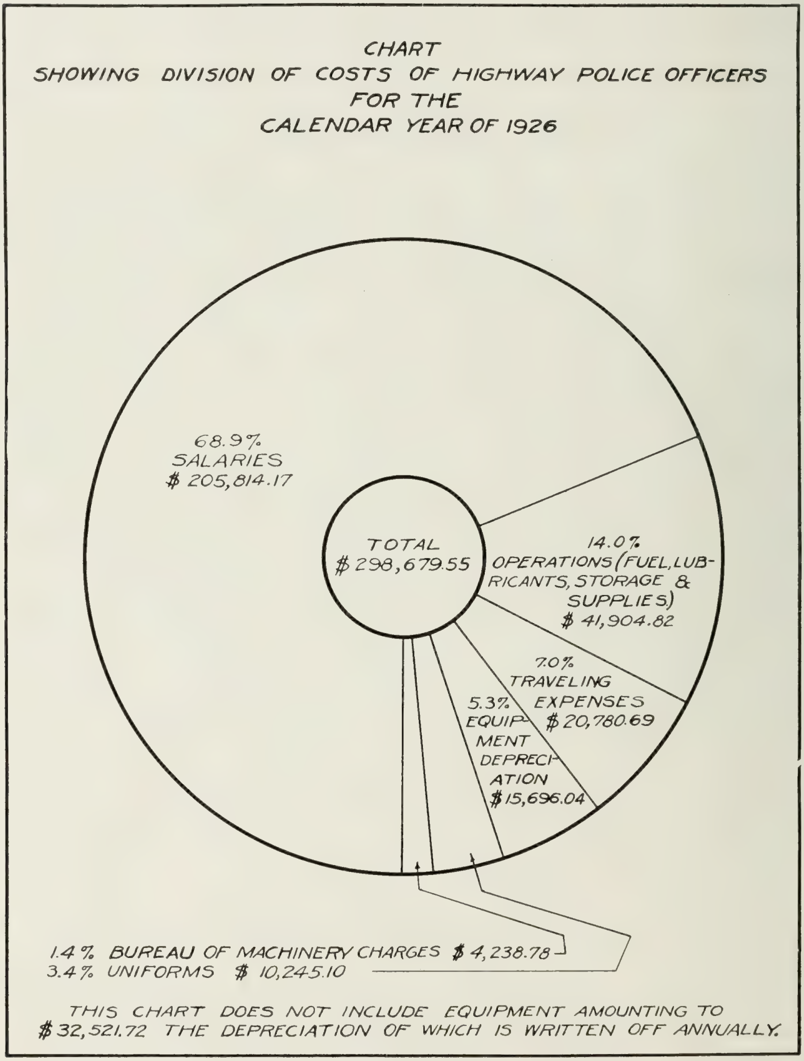
CHART
SHOWING DIVISION OF COSTS OF HIGHWAY POLICE OFFICERS
FOR THE
CALENDAR YEAR OF 1926
68.9%
SALARIES
$ 205,814.17
TOTAL
$ 298,679.55
14.0%
OPERATIONS (FUEL, LUBRICANTS, STORAGE &
SUPPLIES)
$ 41,904.82
7.0%
TRAVELING
EXPENSES
$ 20,780.69
5.3%
EQUIPMENT
DEPRECIATION
$ 15,696.04
1.4% BUREAU OF MACHINERY CHARGES $ 4,238.78
3.4% UNIFORMS $ 10,245.10
THIS CHART DOES NOT INCLUDE EQUIPMENT AMOUNTING TO
$ 32,521.72 THE DEPRECIATION OF WHICH IS WRITTEN OFF ANNUALLY.

Figure 67.

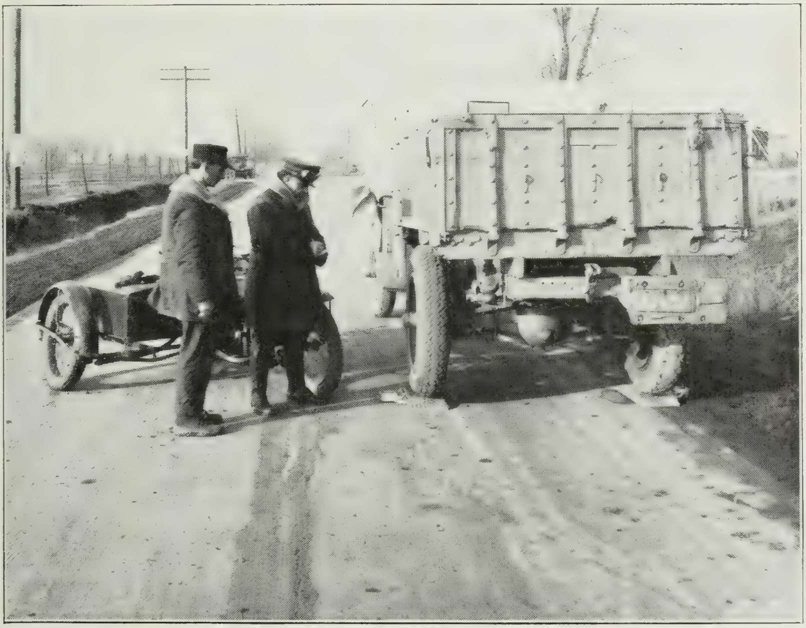

Figure 68.

V. BUREAU OF MATERIALS.

1. GENERAL.—The effects of variations in the quality of materials are usually less tangible than the effects of errors in construction practice but are equally as important to the durability of the project. Materials of a uniformly high quality are necessary to produce pavements of the present standard, and such materials must be obtained by rigid inspection. It is the duty of the Bureau of Materials to determine the suitability of the materials and to reject such portions as fail to comply with the requirements of the specifications. Table XXX shows the quantity of materials inspected at plants for highway work in Illinois and unit cost of inspection for the calendar year 1926. Figure 69 shows the quantity of materials inspected and unit cost of inspection for the calendar years 1919 to 1926 inclusive. Inspection rendered for county and township highway work, in some instances, and, for other States. Table XXXI shows the quantity of materials inspected for other departments of the State of Illinois and for other States, during the calendar year 1926.

The Bureau of Materials also conducts research and investigational work along lines related to the quality of materials, methods of testing for satisfactory quality, and methods of design and construction. The data obtained by this work enables the Department to standardize the quality of the materials for highway construction, to devise suitable inspection procedures, and to furnish reliable data regarding methods of design and construction.

Figure 70 shows the relative proportion of the various activities of this Bureau by distribution of expense, for the calendar years 1920 to 1926, inclusive. Since this distribution is based upon the total expense of operating the Bureau, the per cent shown for the various activities is not indicative of the quantity of the work carried on.

2. FIELD INSPECTION OF MATERIALS.—Inspectors are maintained at all plants making shipments of appreciable quantities of materials. In instances where it is practicable, a single inspector covers the work at more than one plant. The placing of inspectors, however, is such as to give efficient service to the producer and contractors and satisfactory co-operation with the District Organization and the Bureau of Construction, with a minimum of expense and loss of time. These inspectors work under the direct supervision of District Engineers of Materials located at the various district headquarters.

Field inspection of aggregates was first begun in the early part of 1920 and proved so satisfactory during that year that this type of inspection was established for other highway materials. In general it might be said that plant inspection (1) expedites the work of contractors by preventing the shipment of unsatisfactory material to the work and consequent delays attending its disposal; (2) it protects the producer from losses which would occur through rejections at destination; (3) it serves to reduce the cost of the materials as the producer does not have to allow for destination rejection losses; and (4) aids in a better control of quality, thereby assisting in the maintenance of the high construction standards.

TABLE XXX—STATEMENT SHOWING QUANTITIES OF MATERIALS INSPECTED AT PLANTS FOR HIGHWAY WORK IN ILLINOIS AND UNIT COST OF INSPECTION FOR THE CALENDAR YEAR 1926.

Material.	Maximum number employees.	Quantity—total inspected.	Unit cost of inspection.		Inspection costs in per cent of total contracts awarded—1926.
			Plant.	Including laboratory overhead.	
*Aggregate	52	1,599,803 Cu. Yds.	$0.076 Cu. Yd.	$0.102 Cu. Yd.	1.269%
Asphalt	2	5,303,241 Lbs.	0.147 Ton	0.152 Ton	0.003%
Cement	16	1,786,670½ Bbls.	0.0134 Bbl.	0.0168 Bbl.	0.254%
Lumber	1	1,142,493 Bd. Ft.	0.74 M. Bd. Ft.	0.76 M. Bd. Ft.	0.007%
Paving brick	1	2,415,400	0.31 M.	0.32 M.	0.006%
Creosoted lug blocks		224 Sq. Yds.	0.022 Sq. Yd.	0.022 Sq. Yd.	
**Road oil	9	42,258,483 Gals.	2.93 Car	3.93 Car	
Steel—					
Chicago District*	6	14,569,279 Lbs.	1.33 Ton	1.77 Ton	0.098%
St. Louis District	1	5,074,344 Lbs.	0.34 Ton	0.36 Ton	0.007%

The total cost of inspection including laboratory overhead for the calendar year 1926 was 1.78% of the total value of contracts awarded during the same period (based on contract value of $13,130,649.32).

* The unit cost of plant inspection for aggregate and steel in the Chicago District for 1926 was slightly higher than for 1925. This increase in cost is due to a decrease in shipments of material caused by the curtailment of our road building program for 1926. The unit cost of inspection of all other materials was appreciably less than for the calendar year 1925.

** The cost per car for inspection of road oil was 0.8 per cent of the value of all the oil inspected during 1926.

a. Aggregate Inspection.—The following quantities of aggregates were inspected during the calendar year 1926: sand, 542,241 cubic yards; gravel, 704,330 cubic yards; and crushed stone, 420,572 cubic yards; total, 1,667,143 cubic yards. Aggregate totaling 89,000 cubic yards was rejected out of this total quantity and the rejections were in approximately the same ratio as the figures shown for the different types inspected. Of the above total, 65,180 cubic yards of pit run gravel were inspected for the Division of Waterways work at Lockport, Illinois and 2,160 cubic yards of sand and gravel for the State of Wisconsin.

To inspect this material, plant inspection was maintained at 111 plants consisting of 83 sand and gravel plants and 28 crushed stone plants. The number of inspectors varied throughout the year with construction activities, the maximum number in the field at any one time being 52. The aggregate portion of Figure 69 shows that the total quantity of aggregates inspected has increased and decreased with the construction program and that the unit inspection cost has increased and decreased as the quantities inspected have decreased and increased, as might be expected in the case of a working organization of this kind. Figure 71 shows the standard field equipment furnished inspectors for carrying on their work. This equipment is complete in every respect and is composed of the most efficient apparatus available for this class of work.

TABLE XXXI—STATEMENT SHOWING QUANTITY OF MATERIALS INSPECTED FOR OTHER DEPARTMENTS OF THE STATE OF ILLINOIS, AND ALSO OTHER STATES, DURING THE CALENDAR YEAR 1926.

Account.	Material.	Quantity inspected.
State of Illinois—		
Department of Agriculture	Cement	1,174 Bbls.
Department of Public Welfare	Cement	1,940 Bbls.
Division of Waterways	Cement	50,678 Bbls.
Division of Waterways	Aggregate	65,180 Cu. Yds.
Department of Purchases and Construction	Lubricating oil	42 Samples.
State of Iowa	Cement	106,274½ Bbls.
State of Michigan	Cement	38,506½ Bbls.
State of Missouri	Steel (Chicago)	3,033,196 Lbs.
State of Tennessee	Steel (Chicago)	471,513 Lbs.
State of Tennessee	Steel (St. Louis)	85,060 Lbs.
State of Wisconsin	Aggregate	2,160 Cu. Yds.

NOTE.—The samples of lubricating oils were tested at the laboratory at Springfield. All the other materials listed were inspected at plants where inspectors were stationed for the purpose of conducting inspection on materials shipped for our own work, and it was not necessary to employ additional help. The Division of Highways is paid for this work at actual cost.

b. Cement Inspection.—Quality of cement used in the construction of highway work is of the highest importance. It is maintained by a thorough system of tests and inspection. Cement tests and inspection are conducted whenever possible at the mills before the cement is shipped. Resident inspectors are located at the mills during the shipping season to sample each car as it is loaded and conduct the tests in the cement company's laboratory, or in a laboratory provided by the Department.

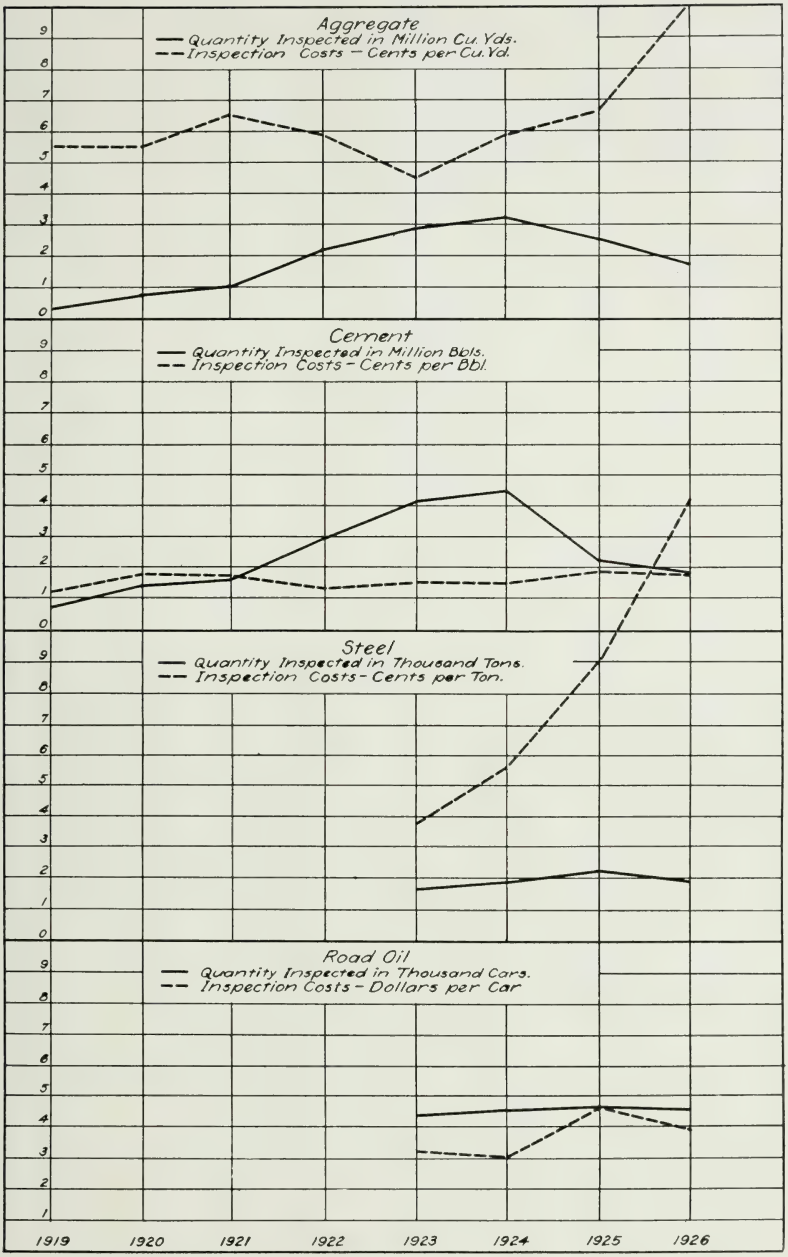
Aggregate
— Quantity Inspected in Million Cu. Yds.
-- Inspection Costs — Cents per Cu. Yd.
Cement
— Quantity Inspected in Million Bbls.
-- Inspection Costs — Cents per Bbl.
Steel
— Quantity Inspected in Thousand Tons.
-- Inspection Costs — Cents per Ton.
Road Oil
— Quantity Inspected in Thousand Cars.
-- Inspection Costs — Dollars per Car
0
1
2
3
4
5
6
7
8
9
1919
1920
1921
1922
1923
1924
1925
1926

Figure 69.

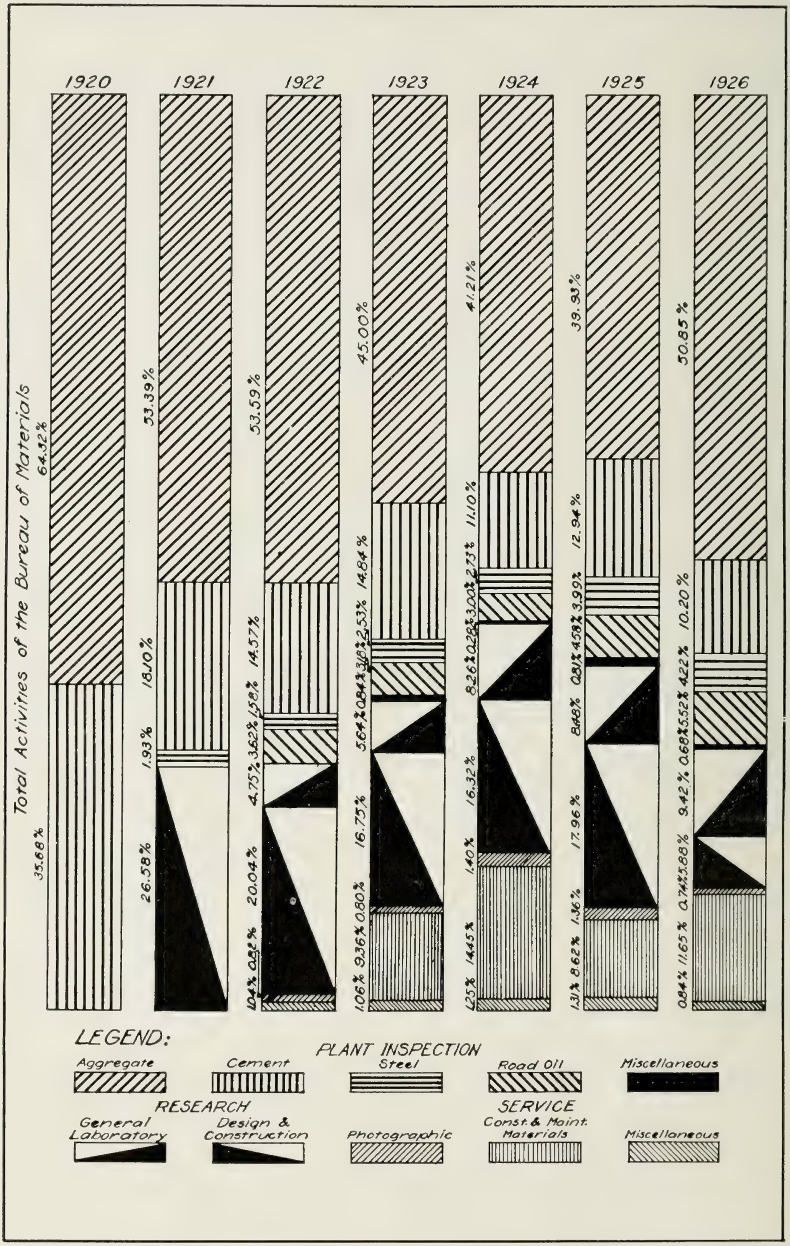

Figure 70.—Chart showing the relative proportion of the various activities of the Bureau of Materials by distribution of expense, for the calendar years 1920 to 1926, inclusive.

Note: The inspection of lumber, paving brick and all other materials not mentioned elsewhere is included under miscellaneous plant inspection. Miscellaneous service covers the making up of exhibits, research apparatus, repairs to and the calibration of the scales used by highway patrol officers, etc.

The thoroughness of inspection given cement is illustrated by stating that from ten to twenty samples are selected from each carload of cement as it is loaded and each sample is tested separately; if a single sample fails or shows the slightest indication of unsoundness or irregularity in setting properties, the entire car of cement is rejected.

During 1926, over 100,000 separate samples were tested, representing approximately 8,000,000 bags of cement. In addition, 7 and 28-day strength tests were made on composite samples from each car and chemical tests were made at frequent intervals on each brand of cement as a further check on its quality.

Cement inspection is conducted at the source of supply in order to save time and delay incident to sampling and testing after the cement gets on the job. By the time the car reaches the site of the work, the engineer in charge has received a report showing that the cement has been accepted and is ready for immediate use.

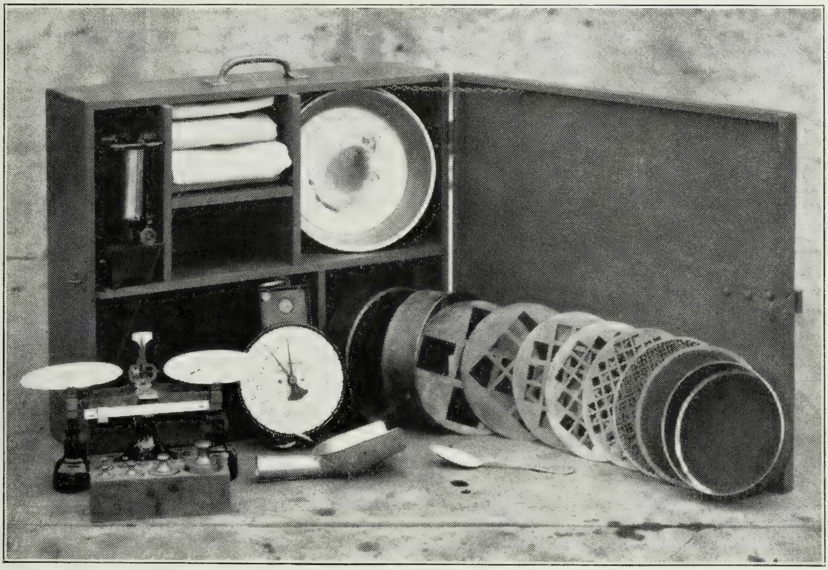

Figure 71.—Standard field equipment furnished material inspectors.

Cement inspection was conducted during 1926 at 11 cement plants located in Illinois, Indiana and Missouri.

The cement portion of Figure 69 shows that the unit cost of cement inspection decreased during the calendar years 1925 and 1926. This decrease is due to the fact that it has not been necessary to maintain inspectors at as many plants and experience has lead to a better organization of this branch of the inspection work.

c. Steel Inspection.—Like cement and other materials, reinforcing steel, metal strip and other steel products used in bridge and pavement construction are inspected and tested at the source of supply whenever possible.

The inspection of steel includes the sampling and testing of the steel in the mill or warehouse before it is loaded and of the supervision of the cutting, bending and loading of the steel.

Concrete reinforcement bars are tested for tensile strength and bending properties. In addition all shipments are carefully inspected for undersized or poorly rolled bars and for bars having surface defects or which show poor workmanship of any kind. Metal strip is inspected during the process of manufacture to insure proper dimensions, alignment, rigidity, riveting and painting.

During 1926, 23,233,392 pounds of reinforcing steel were inspected at 15 plants located in the Chicago District and 4 plants in the East St. Louis District. Inspection in the Chicago District is conducted from a branch steel laboratory, centrally located with respect to the steel warehouses and mills, and equipped with a 100,000 pound Universal testing machine, a cold bend testing machine and other necessary equipment for testing steel. In the East St. Louis District the steel company's equipment is used.

The steel portion of Figure 69 shows a decided upward movement of the unit cost of steel inspection. This is due to the fact that the rigidity of steel inspection has been increased to a marked extent.

d. Road Oil Inspection.—The Department does not use road oil in the construction or maintenance of the primary road system. Road oil, however, is used by the counties and townships on the secondary roads, particularly in those portions of the State where gravel or stone is not available locally. This branch of inspection is a service which the Department has rendered the counties and townships in the past.

Tests and inspection of road oil are conducted at the refineries. Each car is sampled as it is loaded and the samples tested for compliance with specifications. In addition to testing oil for quality, each car is gauged or accurately measured and proper deductions made for the expansion of oil loaded hot. The inspectors make their reports direct to the county or township officials entitled to receive them.

Road oil differs from other materials in that visual inspection offers no information as to its quality, nor is it possible for the purchaser of a car of oil to check the quantity of oil contained in a tank car when he receives it. The State inspection service is the only assurance that a county or township official has that he is getting the quantity and quality of oil which he is paying for.

During 1926, a total of 42,258,483 gallons or 4,612 cars were inspected; 13.347,248 gallons were shipped from four refineries located in Illinois and Indiana and 28,911,235 gallons were shipped from nine refineries located in southern Arkansas and northern Louisiana.

e. Lumber Inspection.—Concrete and steel are gradually replacing wood in highway work, but notwithstanding this, 638,352 board feet of treated and untreated lumber and piling of different species, as well as 19,823 white cedar guard fence posts, were inspected during the calendar year 1926. Most of the guard fence posts were inspected at the shipping points in northern Wisconsin and Michigan. The inspection of the lumber and piling was made by the District Engineer of Materials at the construction sites, except creosoted material which in most cases was inspected at the creosoting plants. Inspection of creosoted material at the plant enables the inspector to inspect not only the quality of the lumber but the preservative treatment as well.

f. Paint Inspection.—Inspection of paint is carried on at manufacturing plants. The separate materials used in mixing the paint are first tested at the laboratory before the grinding and mixing is undertaken. The plant inspector watches the grinding operations and the proportioning of the materials, weighing the mixed paint and checking the total yield of the various batches produced. A total of 18,905 gallons of paint was inspected during the calendar year 1926 produced at two different plants.

In addition to the plant inspection, this bureau handles the storage and shipping of the paint to the various construction jobs, and keeps in close touch with difficulties developed during its application in the field. If trouble is experienced an investigation is made to determine and remedy the causes, if possible. In 1926 trouble developed on two jobs and in both cases it was due to either improper stirring or poor application and not to the quality of the paint.

3. LABORATORY TESTS OF SAMPLES.—Samples tested in the main laboratory of the Bureau of Materials are in general of three classes:

(a) Preliminary samples.
(b) Samples for acceptance tests.
(c) Samples for detailed examination and winter work.

a. Preliminary samples.—Preliminary samples are frequently submitted by producers to obtain information on the quality of their product when the manufacturers or producer are in doubt as to the quality or not familiar with the requirements of our specifications.

Acceptances of preliminary samples, however, is not construed as acceptance of all materials produced. Individual shipments are required to pass inspection separately.

b. Acceptance Tests.—Acceptance tests are performed in the laboratory on samples of various materials which have arrived on the construction site without previous inspection. Also many types of materials cannot be inspected in the field on account of the intricate nature of the tests required, such as chemical analyses or special physical tests. These materials are sampled by our engineers and tests performed in the Springfield laboratory.

The laboratory is equipped for making complete tests of nearly every type of material used in highway work. The following table shows the number of samples of different types of materials tested by the main laboratory and the number of samples accepted and rejected.

These samples do not include aggregate samples submitted for winter work nor cement samples submitted by plant inspectors for fineness and chemical analyses. Of these latter samples 864 were tested for fineness and 146 for chemical analysis. The samples listed as accepted conditionally were those in which some slight defect was present and which could be corrected by adjustment in the use of or production of material. The total number of samples examined for acceptance tests was 906 in the chemical laboratory and 1,470 in the physical laboratory, 406 of which were tested in both physical and chemical laboratories. Table XXXII shows the total number of samples tested in the main laboratory—1926.

TABLE XXXII—SAMPLES OF MATERIALS TESTED IN GENERAL LABORATORY 1926.

Type.	Satisfactory.	Accepted conditionally.	Rejected.	Total.
Aggregate	60	21	30	111
Rock (quarry samples)	4	3	12	19
Cement	1,165	24	12	1,201
Steel bars	49	8	21	78
Gasoline	6	---	1	7
Lubricating oil	76	---	5	81
Tars, pitches and creosotes	34	---	5	39
Asphalts	53	---	---	53
Road oils	69	---	---	69
Paint and paint materials	86	---	14	100
Calcium chlorides	60	---	1	61
Water for concrete	34	---	3	37
Miscellaneous	113	---	1	114
Total	1,809	56	105	1,970

c. Detailed Examination of Aggregate Samples.—In addition to samples of materials submitted for acceptance tests, tests of representative samples are made each year to obtain additional information as to the quality of various material furnished for highway construction. More comprehensive tests are performed than are possible in the field and which enable a close check in quality to be kept. Fifty samples of gravel and 23 samples of crushed stone were examined during 1926 in carrying on this work.

4. RESEARCH ON QUALITY OF MATERIALS.—In addition to the acceptance tests performed in the laboratory and field, research is also conducted each year on the quality of materials. During the calendar year 1926 the following work was carried on:

a. Aggregate Durability Tests.—The coarse aggregates were tested for durability by subjecting them to alternate freezing and thawing and to the sodium sulphate soundness test. These tests were designed to indicate the resistance to disintegrating action of the weather.

b. Aggregate Bulking Tests.—The fine aggregates were subjected to the bulking test to determine the reduction in volume of material in a unit measure due to the swelling and separation of grains with the addition of various percentages of moisture. This phenomenon considerably affects the accuracy of proportioning materials for concrete and its effects on concrete are not always duly appreciated by engineers. The bulking of sand in many cases is responsible for harshness or lack of workability of the concrete and for decreased yield and use of excess cement.

c. Mortar Strength and Voids Tests.—The fine aggregates were also subjected to tests for their mortar's strength and mortar voids to determine their relative concrete making properties.

d. Concrete Making Properties of Crushed Stone.—Tests were also made on the concrete making properties of crushed stone. For these tests, twenty-one samples of crushed stone were received from different quarries, from carload lots accepted by the State for highway construction and representing a typical sample as to gradation, cleanliness and quality.

e. Crack and Joint Filler Research.—Investigation of various grades of bituminous crack and joint fillers. Ten grades of asphalt fillers were obtained from five refineries and carefully applied in July 1925 and re-applied in December as crack and joint maintainers, to an equal number of one half mile sections.

f. Durability of Paint for Steel Structures.—This investigation was started in April 1926 for the purpose of determining the quality of various combinations of ingredients and kinds of pigments in paint when applied to steel and exposed to the action of the elements. This investigation includes various combinations of ingredients and kinds of pigments in paints which have been used or which may be used by the Division of Highways for the purpose of painting steel structures.

The various paints were applied to 100 steel panels ⅛″ x 16″ x 23″ in dimensions and exposed on the paint fence shown in Figure 72. These panels will be observed at frequent intervals and failures will be noted.

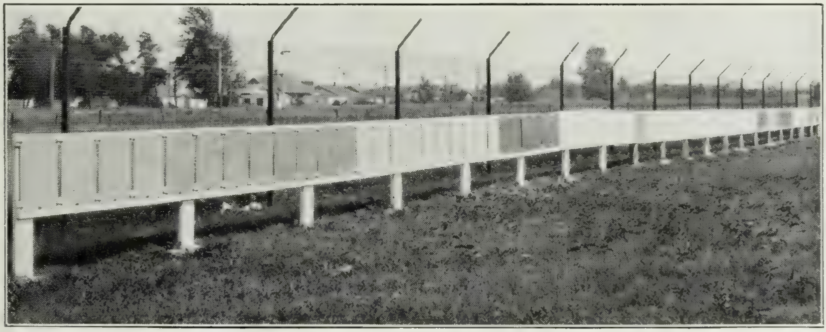

Figure 72.—Experimental paint fence.

g. Road Oil Expansion Tests.—Investigation to determine the expansion of road oils which were used in the treatment of earth roads in Illinois.

5. RESEARCH ON METHODS OF TESTING.—In order to provide means of determining the quality of materials, it is necessary to do considerable research in methods of testing. New methods must be studied before they can be adopted as standard. Likewise, the effect of standard methods must be studied when they are applied to new materials. In order to keep abreast of developments in equipment and

methods, it is essential that research on methods of testing be carried on.

(a) In the physical laboratory, the application of tests of Na_2SO_4 soundness and freezing and thawing to determine the durability of coarse aggregates is being investigated. Suitable tests of this nature will serve eventually to throw out materials which are not sufficiently durable to withstand the action of the weather.

(b) On cement we have studied the effect on the determination of tensile strength which resulted from increasing the pressure used in placing the mortar in the moulds. This investigation showed clearly that this factor needs rigid control for the strength of test specimens increased with the increase of moulding pressure.

(c) The use of the pycnometer for determination of apparent specific gravity of fine aggregates was also studied. This new method has proved more convenient than the present standard and also gives more accurate results.

(d) Field Tests for Modulus of Rupture by Cantilever Method. The application of the cantilever method to field testing of concrete now widely used throughout the United States was first developed by this Department. During the past year the method was used rather extensively in determining the strength of field concrete. Work is underway in perfecting the apparatus used.

6. RESEARCH ON PAVEMENT DESIGN AND CONSTRUCTION.—The research work in pavement design and construction carried on during the calendar year 1926, was:

a. Field Studies.—Field studies of difficulties encountered in construction work caused by materials or combination of materials and other agencies.

b. Pavement Cores.—Cores taken from completed pavement are tested for strength and quality of concrete. This is the best field control available to insure quality and required quantity in the finished work. Primarily the purpose of taking cores is to check the thickness of the slab, but the cores drilled are also carefully observed and tested for quality and strength by making absorption, weight per cu. ft. and compression strength determinations.

c. Impact.—While no field work in connection with impact was done during 1926, considerable time was spent in assembling and analyzing the data previously collected.

All of the data obtained in connection with these tests have been analyzed, curves drawn up and imperical formulas developed for the two classes of impact, both "raise" and "drop" for the two trucks used. Had other trucks, having different unsprung loads and tire equipment, been available it would have been possible to develop one general formula for each class of impact which would apply to any moving vehicle in terms of the sprung and unsprung loads, tire and spring properties, the irregularities of the pavement surface, the speed of the vehicle and perhaps the radius of the wheel.

d. Multiple Loading.—This investigation, started in November 1926, is an attempt to determine the magnitude of the wheel loads and the spacing of the two rear axles on six-wheel trucks which will produce stresses in concrete pavement which do not exceed those produced by a four-wheel truck carrying the legal load limit.

e. Longitudinal Tee-Bars.—To compare the characteristics of Tee-Bars and the three-fourths inch round bars used in the edges of our concrete pavement, a quantity of these bars were installed in a test section of standard concrete pavement.

The results of the tests indicate that neither bar has at all times ability to develop its highest efficiency in transferring a load across a joint and also that the temperature has a marked tendency to affect the efficiency of a joint.

f. Highway Fill Settlement.—Observations of watersoaking operations were made to determine to what extent highway fill settlement may be eliminated or controlled, to develop a proper method of performing the work, to ascertain the most suitable equipment to use and to collect any other useful or essential data pertinent to this investigation.

7. PREPARATION OF SPECIFICATIONS AND REPORTS.—The work of collecting the necessary information and compiling the materials specifications used by the Division of Highways is carried on by the Bureau of Materials as well as compiling the reports of all research and investigational work.

8. DEPARTMENTAL SERVICE.—The following departmental services are rendered by this Bureau:

a. Photographic.—The photographic section was established during the operation of the Bates Experimental Road to obtain records of investigations and conditions of the various sections, which could be preserved in no other way. Since that time, it has proved invaluable in securing records of road improvement and in other work. Reproductions of maps, reports, and other data where the use of photographs is advisable are made for the various departments of the Division. Many of these records have been used in legal cases where exact duplication of the original is necessary.

The following table shows the number of films, prints, and slides prepared for various Bureaus:

TABLE XXXIII—SHOWING THE NUMBER OF FILMS, PRINTS AND SLIDES PREPARED FOR THE VARIOUS BUREAUS.

	Films.	Prints.	Slides.
Bureau of Materials	*234	**1,431	0
Exhibits	0	318	0
Highway Executive Office	2	13	1
Bureau of Audits	20	189	0
Bureau of Construction	28	4,208	0
Bureau of Design	175	2,261	0
Bureau of Maintenance	21	429	0
District No. 1	13	13	0
District No. 2	6	0	0
District No. 3	0	90	0
District No. 6	79	417	0
Total	578	9,369	1

* Includes 38 films of "before and after construction" scenes in Districts 3 and 4.

** Includes 754 prints of "before and after construction" scenes in the various districts throughout this State.

During 1926, sample books containing pictures of construction scenes from various districts have been prepared. These are available at the laboratory for the selection of pictures from films on file. An index of all the films on file has also been prepared to facilitate ordering the prints desired.

b. Mechanical Service.—Some of the services rendered by this section are:

1. The calibrating and repairing of portable scales used by the highway patrol officers.
2. The construction and repairing of highway exhibits which are sent to the various county fairs.
3. The construction of mechanical apparatus used in highway research.
4. Construction and repair of various kinds of equipment.

c. Paint for Construction and Maintenance.—This Bureau inspects, stores and distributes paint for the construction and maintenance departments.

By centralizing the handling of this paint, considerably lower prices have been secured, due to the paint being purchased in carload lots. Also the cost of inspection has been greatly reduced. Inspection at the manufacturing plant eliminates the necessity of conducting inspection on individual shipments for each particular section of work.

Table XXXIV shows the quantity of paint distributed during the calendar year 1926.

TABLE XXXIV—REPORT COVERING PAINT HANDLED BY BUREAU OF MATERIALS DURING THE CALENDAR YEAR 1926, FOR HIGHWAY WORK IN ILLINOIS.

Account.		Paint furnished—gallons.			
		Sublimed blue lead paint.	White lead paint.	Highway yellow paint.	Inventory, gallons.
On hand January 1, 1926—					
Sublimed blue lead paint	615 Gals.				
White lead paint	438 Gals.				
Highway yellow paint	769 Gals.				
Total		----------	----------	----------	1,822
Received during year 1926—					
Sublimed blue lead paint	8,600 Gals.				
White lead paint	9,210 Gals.				
Highway yellow paint	1,095 Gals.				
Total		----------	----------	----------	18,905
					20,727
Furnished free to contractors in accordance with terms of contracts		4,714¼	1,636	----------	
Charged to contractors account used in excess of maximum amount allowed by special provisions of contract		15	15	----------	
Furnished for miscellaneous State work required paint paid for by contractor		30	530	----------	
Furnished by township and county work—paint paid for by county or contractor		1,113	507	----------	
Bureau of Construction—day labor		310	455	----------	
Bureau of Machinery		50	5	----------	

TABLE XXXIV—Concluded.

Account.	Paint furnished—gallons.			
	Sublimed blue lead paint.	White lead paint.	Highway yellow paint.	Inventory, gallons.
Bureau of Maintenance—				
General	5	186½	128½	
District No. 1	165	150	50	
District No. 2	50	810	110	
District No. 3	200	800	125	
District No. 4	60	730	165	
District No. 5	50	700	50	
District No. 6	90	465	45	
District No. 7	50	600		
District No. 8	15	275	150	
District No. 9	40	1,100	100	
Bureau of Materials	9	18½	½	
Department of Agriculture		45		
Total	6,966¼	9,028	924	
Less paint furnished during 1926				16,918¼
On hand January 1, 1927—				
Sublimed blue lead paint 2,248¾ Gals.				
White lead paint 620 Gals.				
Highway yellow paint 940 Gals.				
Balance				3,808¾

VI. BUREAU OF AUDITS.

1. ACCOUNTING AND AUDITING.—The total expenditures of the Division of Highways during 1926 amounted to $24,267,209.06 covered by 46,926 vouchers.

The following statement represents the collections of the Division of Highways and the sources from which they were collected for the calendar year 1926:

TABLE XXXV—STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS AND SOURCES FROM WHICH COLLECTED FROM JANUARY 1, 1926, TO DECEMBER 31, 1926.

Month.	Engineering, inspection and tests.	Construction refunds.	Maintenance refunds.	Equipment, rentals and sales.	Total.
January	$ 194.63	$ 472.46	$ 194.49	$1,784.47	$ 2,646.05
February	380.16	393.27	228.61	208.36	1,210.40
March	2,490.67	60.97	2,349.72	205.39	5,106.75
April	1,422.53	457.13	7,038.08	112.18	9,029.92
May	165.65	783.93	10,143.89	9,889.83	20,983.30
June	1,287.37	1,143.32	1,655.32	7,431.20	11,517.21
July	344.47	4,016.36	1,705.21		6,066.04
August	79,494.91	8,499.93	6,026.85	4,951.56	98,973.25
September	659.08	3,891.39	8,340.57	934.24	13,825.28
October	1,739.59	8,388.54	1,260.79		11,388.92
November	224.93	4,107.30	633.17	1,412.90	6,378.30
December	953.14	208.64	3,028.45		4,190.23
Total	$89,357.13	$32,423.24	$42,605.15	$26,930.13	$191,315.65

2. REPORTS AND FINANCIAL ESTIMATES.—In the following pages will be found financial and statistical statements relating to the work of the Division of Highways.

The following statement represents the revenue which has been deposited in the Road Fund during the years 1911 to 1926 inclusive and shows a comparison of the amounts collected for the years 1921 to 1926 inclusive against previous years' collections:

TABLE XXXVI—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Total.
1911	$ 74,552.59			$ 74,552.59
1912	364,708.03			364,708.03
1913	499,802.45			499,802.45
1914	700,233.00			700,233.00
1915	903,284.09			903,284.09
1916	1,238,483.92			1,238,483.92
1917	1,629,445.26			1,629,445.26
1918	2,770,084.60		$ 85.00	2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50	3,765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68	11,111,995.56
Sub-total	$17,273,087.13	$5,724,799.05	$60,390.18	$23,058,276.36
1921	$ 6,862,125.83	$3,802,430.46	$221,645.55	$10,886,201.84
1922	7,904,219.71	1,733,334.86	132,495.77	9,770,050.34
1923	9,677,318.64	4,257,276.06	127,847.10	14,062,441.80
1924	11,557,838.94	3,565,058.69	300,045.58	15,422,943.21
1925	13,050,977.39	2,717,923.43	514,260.69	16,283,161.51
1926	13,937,579.64	2,036,921.95	214,330.36	16,188,831.95
Sub-total	$62,990,060.15	$18,112,945.45	$1,510,625.05	$82,613,630.65
Grand total	$80,263,147.28	$23,837,744.50	$1,571,015.23	$105,671,907.01

The following statement represents the appropriations which have been made by the General Assembly from the Road Fund since 1913:

TABLE XXXVII—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For maintenance.	For State highways.	For county refunds.	For cement plant.	For Fay Hunsley relief.	For gravel plant.	Principal and interest on highway bonds.	Refunds to municipalities.	Construction through municipalities.	Total.
1913	$ 400,000.00											$ 400,000.00
1914	700,000.00											700,000.00
1915	1,000,000.00											1,000,000.00
1916	1,000,000.00											1,000,000.00
1917	1,200,000.00	$ 1,326,000.00										2,526,000.00
1919	500,000.00	26,600,000.00						$125,000.00				27,225,000.00
1921			$3,000,000.00	$20,000,000.00	$3,889,382.23	$5,000,000.00	$4,000.00		$ 1,000,000.00			32,893,382.23
1923			3,000,000.00	20,000,000.00	4,025,632.56	5,000,000.00			4,000,000.00			36,025,632.56
1925			6,000,000.00	35,000,000.00	2,704,818.95	5,000,000.00			12,320,000.00	$300,000.00	$1,000,000.00	62,324,818.95
Total	$4,800,000.00	$27,926,000.00	$12,000,000.00	$75,000,000.00	$10,619,833.74	$15,000,000.00	$4,000.00	$125,000.00	$17,320,000.00	$300,000.00	$1,000,000.00	$164,094,833.74

The following statement represents the expenditures made from the Road Fund during the years 1914 to 1926 inclusive and shows a comparison of the amounts expended during the years 1921 to 1926 inclusive as compared with previous years:

TABLE XXXVIII—EXPENDITURES FROM THE ROAD FUND 1914 TO 1926.

Year.	State aid construction.	Federal aid and S. B. I. construction.	Maintenance.	Refunds to counties.	Fay Hunsley relief.	Interest and principal on 60m and 100m bonds.	Construction through municipalities.	Total.
1914	$ 364,202.39							$ 364,202.39
1915	652,644.73		$ 9,871.50					662,516.23
1916	660,561.93		20,686.43					681,248.36
1917	1,106,034.79		35,532.26					1,141,567.05
1918	356,120.42	$ 190,578.78	37,303.98					584,003.18
1919	538,502.90	4,352,870.62	84,614.37					4,975,987.89
1920	263,765.75	11,108,931.33	208,802.55					11,581,499.63
Sub-total	$3,941,832.91	$15,652,380.73	$396,811.09					$19,991,024.73
1921	$115,167.91	$11,933,939.19	$ 358,657.85	$ 719,273.18	$4,000.00			$13,131,038.13
1922	32,768.68	6,837,603.37	640,503.01	1,798,184.50		$ 757,460.00		10,066,519.56
1923	25,975.27	9,234,214.69	1,110,034.41	1,411,337.49				11,781,561.86
1924		12,522,782.01	2,044,860.69	1,176,893.14		1,388,813.35		17,133,349.19
1925		9,269,469.84	1,834,637.74	602,050.80		2,687,303.72	$ 19,592.59	14,413,054.69
1926		8,630,399.97	2,265,822.58	499,200.93		5,510,843.18	538,374.33	17,444,640.99
Sub-total	$173,911.86	$58,428,409.07	$8,254,516.28	$6,206,940.04	$4,000.00	$10,344,420.25	$557,966.92	$83,970,164.42
Total	$4,115,744.77	$74,080,789.80	$8,651,327.37	$6,206,940.04	$4,000.00	$10,344,420.25	$557,966.92	$103,961,189.15

The following statement represents the collection of motor license fees by the Secretary of State, and shows the number of vehicles from which the collections were made during the calendar years 1911 to 1926 inclusive:

TABLE XXXIX—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Year of collection.	Number of vehicles.	Fees collected.
1911	38,269	$ 105,344.28
1912	68,012	375,716.22
1913	94,646	507,134.77
1914	131,140	703,403.70
1915	180,832	924,905.74
1916	248,429	1,242,509.65
1917	340,252	1,587,772.69
1918	389,761	2,762,567.53
1919	478,438	3,262,176.57
1920	568,759	5,893,586.02
1921	670,452	6.663,910.22
1922	785,378	7,861,211.21
1923	969,092	9,630,367.77
1924	1,132,641	11,513,957.05
1925	1,267,734	12,936,882.13
1926	1,375,191	14,047,207.86
Total 1911 to 1926		$80,018,653.41

NOTE.—This statement represents the collections of motor fees by calendar years of Secretary of State's office and can not be compared with the revenue deposited with the State Treasurer due to the fact that the law requires the Secretary of State to deposit his collections each thirty days following the date of receipt.

The following statement represents the collection of motor license fees by months for the calendar years 1923, 1924, 1925 and 1926:

TABLE XL—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

	1923	1924	1925	1926
January	$4,014,285.44	$5,542,566.42	$5,952,896.84	$6,572,605.72
February	1,740,113.23	1,800,877.12	2,355,086.26	2,526,795.92
March	1,143,169.52	1,203,696.55	1,480,242.01	1,757,830.67
April	814,812.00	1,109,041.92	1,241,706.96	925,950.19
May	660,851.24	672,716.70	599,550.75	800,539.64
June	381,256.39	335,451.15	370,950.36	430,240.42
July	349,875.26	351,320.94	378,403.54	434,947.22
August	213,537.77	192,873.25	219,491.73	258,046.32
September	131,154.87	137,691.72	159,867.43	168,085.08
October	109,111.62	106,516.39	108,431.17	102,286.57
November	53,007.85	47,113.75	50,544.89	52,548.86
December	19,192.58	14,091.14	19,710.19	17,331.25
Total	$9,630,367.77	$11,513,957.05	$12,936,882.13	$14,047,207.86

The following statement represents the collection of motor license fees by counties during the calendar years 1923, 1924, 1925 and 1926:

TABLE XLI—SCHEDULE OF MOTOR FEES BY COUNTIES AS COLLECTED BY SECRETARY OF STATE.

	1923	1924	1925	1926
Cook	$3,230,180,00	$4,146,998.00	$4,788,890.00	$5,286,139.00
Adams	114.990,00	131,363.00	143,670.00	152,420.00
Alexander	21,980.00	28,418.00	32,750.00	36,390.00
Bond	26,995.00	31,215.00	33,568.00	36,830.00
Boone	33,982.00	37,595.00	42,090.00	44,010.00
Brown	16,450.00	17,100.00	18,674.00	20,950.00
Bureau	92,866.00	104,925.00	113,090.00	117,520.00
Calhoun	9,824.00	12,110 00	13,956.00	14,752·00
Carroll	46,841.00	49,942.00	52,201.00	56,375.00
Cass	38,884.00	40,101.00	47,299.00	46,990.00
Champaign	139,863.00	163,098.00	196,100.00	187,333.00
Christian	69,520.00	80,393.00	93,993.00	98,844.00
Clark	39,452.00	44,928.00	49,238.00	51,835.00
Clay	18,898.00	23,818.00	31,675.00	35,287.00
Clinton	31,880.00	35,991.00	41,410.00	44,540.00
Coles	66,590.00	77,512.00	83,698.00	89,826.00
Crawford	52,337.00	56,980.00	63,612.00	67,358.00
Cumberland	16,270.00	21,001.00	23,091.00	24,449.00
DeKalb	81,480.00	90,185.00	98,277.00	103,242.00
DeWitt	40,442.00	44,044.00	48,170.00	47,766.00
Douglas	45,338.00	46,860.00	48,314.00	51,035.00
DuPage	103,110.00	131,091.00	162,200.00	191,933.00
Edgar	54,965.00	60,358.00	66,799.00	70,861.00
Edwards	14,496.00	17,611.00	21,303.00	24,144.00
Effingham	28,730.00	36,984.00	43,612.00	46,537.00
Fayette	26,792.00	32,130.00	38,998.00	44,370.00
Ford	41,961.00	44,050.00	47,856.00	49,744.00
Franklin	85,715.00	105,513.00	120,910.00	122,890.00
Fulton	96,990.00	109,841.00	116,795.00	119,871.00
Gallatin	10,729.00	12,480.00	17,308.00	18,930.00
Greene	32,874.00	37,900.00	43,610.00	47,111.00
Grundy	37,441.00	43,222.00	46,882.00	51,643.00
Hamilton	10,722.00	13,481.00	17,600.00	19,945.00
Hancock	68,388.00	74,585.00	79,145.00	81,646.00
Hardin	3,760.00	5,635.00	7,610.00	7,644.00
Henderson	18,977.00	19,759.00	22,020.00	22,477.00
Henry	110,333.00	118,853.00	127,015.00	132,830.00
Iroquois	86,950.00	92,250.00	99,111.00	102,674.00
Jackson	49,461.00	63,500.00	71,600.00	79,011.00
Jasper	19,615.00	23,867.00	27,840.00	29,310.00
Jefferson	35,570.00	46,914.00	59,913.00	61,822.00
Jersey	16,711.00	19,001.00	23,010.00	25,380.00
JoDaviess	43,855.00	48,196.00	52,676.00	58,212.00
Johnson	9,444.00	12,020.00	16,222.00	18,079.00
Kane	199,250.00	237,250.00	264,120.00	296,115.00
Kankakee	86,966.00	102,070.00	111,680.00	114,200.00
Kendall	24,008.00	26,760.00	30,091.00	32,800.00
Knox	104,340.00	117,583.00	128,188.00	135,366.00
Lake	126,931.00	164,874.00	189,660.00	216,760.00
LaSalle	174,960.00	203,732.00	226,655.00	238,399.00
Lawrence	41,900.00	47,438.00	51,430.00	57,500.00
Lee	72,440.00	81,695.00	88,127.00	95,290.00
Livingston	94,585.00	96,643.00	105,951.00	108,964.00
Logan	64.210.00	65,268.00	70,745.00	72,866.00
Macon	125,455.00	152,421.00	177,140.00	190,187.00
Macoupin	88,980.00	101,125.00	111,684.00	113,950.00
Madison	172,910.00	219,872.00	251,480.00	282,570.00
Marion	60,221.00	69,952.00	76,391.00	83,693.00
Marshall	31,410.00	31,389.00	33,836.00	35,456.00
Mason	40,112.00	43,784.00	46,984.00	49,670.00
Massac	12,920.00	16,587.00	19,156.00	19,377.00
McDonough	61,133.00	68,457.00	74,280.00	78,900.00
McHenry	81,911.00	94,563.00	101,998.00	109,631.00
McLean	160,871.00	176,324.00	194,757.00	197,611.00
Menard	24,955.00	26,839.00	29,800.00	30,713.00
Mercer	50,127.00	51,215.00	52,350.00	53,722.00
Monroe	22,260.00	25,777.00	28,675.00	32,040.00
Montgomery	71,008.00	81,897.00	85,582.00	87,166.00
Morgan	57,004.00	63,690.00	69,988.00	78,040.00
Moultrie	26,980.00	27,829.00	31,812.00	33,468.00
Ogle	73,120.00	80,357.00	83,751.00	88,940.00
Peoria	235,866.00	271,726.00	288,980.00	303,012.00
Perry	33,783.00	40,952.00	43,333.00	46,566.00
Piatt	41,200.00	41,620.00	44,989.00	46,911.00
Pike	41,944.00	47,325.00	54,211.00	59,683.00

TABLE XLI—Concluded.

	1923	1924	1925	1926
Pope	$ 4,895.00	$ 5,766.00	$ 8,985.00	$ 9,740.00
Pulaski	13,700.00	17,252.00	19,691.00	22,299.00
Putnam	12,622.00	13,785.00	14,383.00	15,390.00
Randolph	43,117.00	51,632.00	55,812.00	60,522.00
Richland	21,933.00	27,501.00	32,618.00	36,591.00
Rock Island	156,847.00	189,946.00	202,866.00	220,141.00
Saline	52,670.00	63,669.00	69,688.00	69,350.00
Sangamon	174,911.00	206,024.00	232,480.00	244,200.00
Schuyler	23,574.00	26,913.00	28,455.00	29,688.00
Scott	16,788.00	19,769.00	22,892.00	24,411.00
Shelby	49,311.00	53,446.00	61,860.00	65,855.00
Stark	28,448.00	29,299.00	31,156.00	33,310.00
St. Clair	209,376.00	255,653.00	282,399.00	301,232.00
Stephenson	89,550.00	98,632.00	105,896.00	112,340.00
Tazewell	70,121.00	80,154.00	92,570.00	96,834.00
Union	19,005.00	28,182.00	33,682.00	36,377.00
Vermilion	158,980.00	185,204.00	203,474.00	208,911.00
Wabash	20,441.00	24,423.00	28,580.00	33,360.00
Warren	59,622.00	64,445.00	67,913.00	73,988.00
Washington	27,791.00	32,677.00	35,618.00	39,142.00
Wayne	20,282.00	26,328.00	32,415.00	36,500.00
White	23,612.00	26,513.00	33,830.00	38,050.00
Whiteside	95,887.00	108,669.00	117,170.00	124,371.00
Will	165,282.00	199,882.00	201,864.00	235,100.00
Williamson	97,559.00	116,409.00	117,111.00	120,401.00
Winnebago	175,678.00	209,671.00	216,980.00	267,950.00
Woodford	51,914.77	53,530.25	57,741.00	60,633.00
Total	$9,630,367.77	$11,546,206.25	$12,969,754.00	$14,047,207.00
Less refunds		32,249.20	32,871.87	
Balance	$9,630,367.77	$11,513,957.05	$12,936,882.13	$14,047,207.00

The following statement represents the allotment of Federal Aid Funds by the U. S. Government to Illinois for the years 1917 to 1928 inclusive:

TABLE XLII.—STATEMENT OF FEDERAL AID FUNDS ALLOTTED BY THE U. S. GOVERNMENT TO ILLINOIS 1917 TO 1928 INCLUSIVE.

Year.	Amount.
1917	$ 220,926.23
1918	441,852.46
1919	2,185,550.65
1919	658,323.48
1920	874,220.26
1920	3,278,325.98
1921	1,091,266.98
1921	3,273,800.93
1922	3,246,281.07
1923	2,164,187.38
1923 Reapportioned	28,611.00
1924	2,797,888.59
1925	3,203,867.99
1926	3,191,479.00
1927	3,175,616.00
1928	3,154,429.00
	$32,986,627.00

The following statement represents the revenue derived from the sale of the $60,000,000.00 Bond Issue and shows the weighted average sale rate together with the weighted average yield on all series sold:

TABLE XLIII—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $60,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	94.020	4.83	$5,000,000.00	$4,709,477.78	$4,709,477.78	----------
1922	Apr. 13	98.875	4.19	6,000,000.00	5,940,111.11	5,940,111.11	----------
1922	Sept. 18	99.688	4.04	6,000,000.00	6,083,855.65	6,083,855.65	----------
1923	Feb. 20	98.183	4.15	6,000,000.00	5,908,333.34	5,908,333.34	----------
1923	May 25	97.000	4.40	7,000,000.00	6,837,667.68	6,837,667.68	----------
1922	Oct. 16	94.41	4.68	6,000,000.00	5,687,266.68	5,687,266.68	----------
1923	Dec. 22	94.46	4.50	6,000,000.00	5,678,266.67	5,667,600.00	10,666.67
1924	June 3	96.525	4.29	9,000;000.00	8,704,200.00	8,704,200.00	----------
1924	Aug. 15	99.109	4.08	9,000,000.00	8,947,800.00	8,919,800.00	28,000.00
Total	----------	97.4949	4.32	$60,000,000.00	$58,496,978.91	$58,458,312.24	$38,666.67

NOTE.—The figure of 4.32 shown under Interest Yield represents the weighted average yield of all series sold.

The figure of 97.4949 shown in the sale rate column represents the average sale rate on all series sold.

The following statement represents the appropriations made by the General Assembly from the $60,000,000.00 Bond Issue Fund:

TABLE XLIV—APPROPRIATIONS PAYABLE FROM $60,000,000.00 BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922			
1923	30,000,000.00	----------	30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

The following statement represents the expenditures which have been made from the $60,000,000.00 Bond Issue Fund for the calendar years 1921 to 1924 inclusive:

TABLE XLV—EXPENDITURES FROM $60,000,000.00 BOND ISSUE FUND 1921 TO 1924.

Year.	Construction.	Refunds to counties.	Total.
1921	$ 2,461,000.65	$ 8,000.00	$ 2,469,000.65
1922	12,420,711.49	637,820.93	13,058,532.42
1923	18,607,796.71	605,182.71	19,212,979.42
1924	23,717,799.75	----------	23,717,799.75
Total	$57,207,308.60	$1,251,003.64	$58,458,312.24

NOTE.—This covers the entire expenditures from the bond fund

The following statements represent the arrangement of the retirement of the principal and payment of interest on all series of the $60,000,000.00 Bond Issue which was voted November 4, 1918:

TABLE XLVI—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $60,000,000.00—4% BONDS.

Total Bond Voted November 4, 1918	$60,000,000.00
Total Bond Authorized for Sale	$60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each year.
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		2,160,000.00	2,160,000.00	4,320,000.00
1926	$2,000,000.00	2,400,000.00	4,400,000.00	8,720,000.00
1927	2,000,000.00	2,320,000.00	4,320,000.00	13,040,000.00
1928	2,000,000.00	2,240,000.00	4,240,000.00	17,280,000.00
1929	2,000,000.00	2,160,000.00	4,160,000.00	21,440,000.00
1930	2,000,000.00	2,080,000.00	4,080,000.00	25,520,000.00
1931	2,000,000.00	2,000,000.00	4,000,000.00	29,520,000.00
1932	2,000,000.00	1,920,000.00	3,920,000.00	33,440,000.00
1933	2,000,000.00	1,840,000.00	3,840,000.00	37,280,000.00
1934	2,000,000.00	1,760,000.00	3,760,000.00	41,040,000.00
1935	3,000,000.00	1,680,000.00	4,680,000.00	45,720,000.00
1936	3,000,000.00	1,560,000.00	4,560,000.00	50,280,000.00
1937	3,000,000.00	1,440,000.00	4,440,000.00	54,720,000.00
1938	4,000,000.00	1,320,000.00	5,320,000.00	60,040,000.00
1939	4,000,000.00	1,160,000.00	5,160,000.00	65,200,000.00
1940	5,000,000.00	1,000,000.00	6,000,000.00	71,200,000.00
1941	5,000,000.00	800,000.00	5,800,000.00	77,000,000.00
1942	5,000,000.00	600,000.00	5,600,000.00	82,600,000.00
1943	5,000,000.00	400,000.00	5,400,000.00	88,000,000.00
1944	5,000,000.00	200,000.00	5,200,000.00	93,200,000.00
Total	$60,000,000.00	$33,200,000.00	$93,200,000.00	$93,200,000.00

TABLE XLVII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sale—Oct. 25, 1921. Date of issue—Nov. 1, 1921. Rate $94.020. Yield $4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$ 100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE XLVIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$6,000,000.00—4% BONDS.

Date of sale—April 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220.000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE XLIX—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue May 1, 1922. Rate $99.688. Yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE L—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—Mar. 1, 1923. Rate $98.183. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$240,000.00	$ 240,000.00	$ 240,000.00
1925		240,000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1933		240,000.00	240,000.00	2,400,000.00
1934		240,000.00	240,000.00	2,640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120,000.00
1937		240,000.00	240,000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000,000.00	160,000.00	1,160,000.00	6,960,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	9,160,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE LI—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Yield 4.40.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$ 280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220,000.00	720,000.00	3,560,000.00
1930	500,000.00	200,000.00	700,000.00	4,260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600,000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1,000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40,000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE LII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16, 1923. Date of issue—Oct. 1, 1923. Rate $94.41. Yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable at May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580,000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE LIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1929		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

TABLE LIV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 8—$9,000,000.00—4% BONDS.

Date of sale—June 3, 1924. Date of issue—June 1, 1924. Rate $96.525. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$270,000.00	$ 270,000.00	$ 270,000.00
1926		360,000.00	360,000.00	630,000.00
1927		360,000.00	360,000.00	990,000.00
1928		360,000.00	360,000.00	1,360,000.00
1929		360,000.00	360,000.00	1,710,000.00
1930		360,000.00	360,000.00	2,070,000.00
1931		360,000.00	360,000.00	2,430,000.00
1932		360,000.00	360,000.00	2,790,000.00
1933		360,000.00	360,000.00	3,150,000.00
1934		360,000.00	360,000.00	3,510,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,370,000.00
1936	500,000.00	340,000.00	840,000.00	5,210,000.00
1937		320,000.00	320,000.00	5,530,000.00
1938		320,000.00	320,000.00	5,850,000.00
1939		320,000.00	320,000.00	6,170,000.00
1940	1,000,000.00	320,000.00	1,320,000.00	7,490,000.00
1941	1,000,000.00	280,000.00	1,280,000.00	8,770,000.00
1942	2,000,000.00	240,000.00	2,240,000.00	11,010,000.00
1943	2,000,000.00	160,000.00	2,160,000.00	13,170,000.00
1944	2,000,000.00	80,000.00	2,080,000.00	15,250,000.00
Total	$9,000,000.00	$6,250,000.00	$15,250,000.00	$15,250,000.00

TABLE LV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—Aug. 15, 1924. Date of issue—Aug. 1, 1924. Rate $99.109. Yield 4.08.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$210,000.00	$ 210,000.00	$ 210,000.00
1916		360,000.00	360,000.00	570,000.00
1927		360,000.00	360,000.00	930,000.00
1928		360,000.00	360,000.00	1,290,000.00
1929		360,000.00	360,000.00	1,650,000.00
1930		360,000.00	360,000.00	2,010,000.00
1931		360,000.00	360,000.00	2,370,000.00
1932		360,000.00	360,000.00	2,730,000.00
1933		360,000.00	360,000.00	3,090,000.00
1934		360,000.00	360,000.00	3,450,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,310,000.00
1936	500,000.00	340,000.00	840,000.00	5,150,000.00
1937		320,000.00	320,000.00	5,470,000.00
1938	1,000,000.00	320,000.00	1,320,000.00	6,790,000.00
1939	1,000,000.00	280,000.00	1,280,000.00	8,070,000.00
1940	1,000,000.00	240,000.00	1,240,000.00	9,310,000.00
1941	1,000,000.00	200,000.00	1,200,000.00	10,510,000.00
1942		160,000.00	160,000.00	10,670,000.00
1943	1,000,000.00	160,000.00	1,160,000.00	11,830,000.00
1944	3,000,000.00	120,000.00	3,120,000.00	14,950,000.00
Total	$9,000,000.00	$5,950,000.00	$14,950,000.00	$14,950,000.00

The following statement represents the amount derived from the sale of $29,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1926:

TABLE LVI—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $100,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Amount deposited in bond fund.	Accrued interest deposited in road fund.
1924	Dec. 30	97.5575	4.29	$ 4,000,000.00	$ 3,913,411.20	$3,902,300.00	$ 11,111.20
1925	May 20	99.881	4.008	10,000,000.00	10,088,100.00	9,988,100.00	100,000.00
1925	Sept. 1	96.422	4.24	10,000,000.00	9,845,533.33	9,642,200.00	203,333.33
1926	Feb. 17	99.062	4.062	5,000,000.00	4,971,988.89	4,953,100.00	18,888.89
Total		98.226	4.07	$29,000,000.00	$28,819,033.42	$28,485,700.00	$333,333.42

The following statement represents the appropriations made from the $100,000,000.00 Bond Issue Fund:

TABLE LVII—APPROPRIATIONS PAYABLE FROM $100,000,000.00 BOND ISSUE FUND.

Year.	For construction.	Amount lapsed Oct. 1, 1925.
1923	$100,000,000.00	$96,000,000.00
1925	96,000,000.00	Re-appropriation
Total	$196,000,000.00	$96,000,000.00

The following statement represents the expenditures made from the sale of $29,000,000.00 of the $100,000,000.00 Bond Issue Fund:

TABLE LVIII—EXPENDITURES FROM $100,000,000.00 BOND ISSUE FUNDS.

Year.	Administration and engineering.	Construction.	Equipment.	Total.
1925	$1,574,167.12	$19,758,908.62	$329,852.54	$21,662,928.28
1926	848,974.69	5,849,113.56	124,479.82	6,822,568.07
Total	$2,423,141.81	$25,608,022.18	$454,332.36	$28,485,496.35

The following statement represents the amount of principal and interest payable at each retirement and interest paying period on $29,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1926:

TABLE LIX—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $29,000,000.00—4% BONDS SOLD TO DECEMBER 31, 1926.

Total bonds voted Nov. 4, 1924	$100,000,000.00
Total bonds authorized for sale	100,000,000.00

Year in which principal is to be retired and interest paid.	Principal to be retired Mar. 1 each year.	Principal to be retired May 1 each year.	Total principal to be retired during year.	Interest to be paid Mar. 1 each year.	Interest to be paid May 1 each year.	Interest to be paid Sept. 1 each year.	Interest to be paid Nov. 1 each year.	Total interest payable each year.	Total payable all series each year.
1925					$ 53,333.33	$400,000.00	$ 80,000.00	$ 533,333.33	$ 533,333.33
1926				$400,000.00	130,000.00	400,000.00	180,000.00	1,110,000.00	1,110,000.00
1927				400,000.00	180,000.00	400,000.00	180,000.00	1,160,000.00	1,160,000.00
1928				400,000.00	180,000.00	400,000.00	180,000.00	1,160,000.00	1,160,000.00
1929				400,000.00	180,000.00	400,000.00	180,000.00	1,160,000.00	1,160,000.00
1930				400,000.00	180,000.00	400,000.00	180,000.00	1,160,000.00	1,160,000.00
1931				400,000.00	180,000.00	400,000.00	180,000.00	1,160,000.00	1,160,000.00
1932		$500,000.00	$500,000.00	400,000.00	180,000.00	400,000.00	170,000.00	1,150,000.00	1,650,000.00
1933		500,000.00	500,000.00	400,000.00	170,000.00	400,000.00	160,000.00	1,130,000.00	1,630,000.00
1934		500,000.00	500,000.00	400,000.00	160,000.00	400,000.00	150,000.00	1,110,000.00	1,610,000.00
1935		500,000.00	500,000.00	400,000.00	150,000.00	400,000.00	140,000.00	1,090,000.00	1,590,000.00
1936		500,000.00	500,000.00	400,000.00	140,000.00	400,000.00	130,000.00	1,070,000.00	1,570,000.00
1937		500,000.00	500,000.00	400,000.00	130,000.00	400,000.00	120,000.00	1,050,000.00	1,550,000.00
1938		500,000.00	500,000.00	400,000.00	120,000.00	400,000.00	110,000.00	1,030,000.00	1,530,000.00
1939		500,000.00	500,000.00	400,000.00	110,000.00	400,000.00	100,000.00	1,010,000.00	1,510,000.00
1940				400,000.00	100,000.00	400,000.00	100,000.00	1,000,000.00	1,000,000.00
1941				400,000.00	100,000.00	400,000.00	100,000.00	1,000,000.00	1,000,000.00
1942				400,000.00	100,000.00	400,000.00	100,000.00	1,000,000.00	1,000,000.00
1943				400,000.00	100,000.00	400,000.00	100,000.00	1,000,000.00	1,000,000.00
1944				400,000.00	100,000.00	400,000.00	100,000.00	1,000,000.00	1,000,000.00
1945	$2,000,000.00	500,000.00	2,500,000.00	400,000.00	100,000.00	360,000.00	90,000.00	950,000.00	3,450,000.00
1946	2,000,000.00	500,000.00	2,500,000.00	360,000.00	90,000.00	320,000.00	80,000.00	850,000.00	3,350,000.00
1947	2,000,000.00	500,000.00	2,500,000.00	320,000.00	80,000.00	280,000.00	70,000.00	750,000.00	3,250,000.00
1948	2,000,000.00	500,000.00	2,500,000.00	280,000.00	70,000.00	240,000.00	60,000.00	650,000.00	3,150,000.00
1949	2,000,000.00	500,000.00	2,500,000.00	240,000.00	60,000.00	200,000.00	50,000.00	550,000.00	3,050,000.00
1950	2,000,000.00	500,000.00	2,500,000.00	200,000.00	50,000.00	160,000.00	40,000.00	450,000.00	2,950,000.00
1951	2,000,000.00	500,000.00	2,500,000.00	160,000.00	40,000.00	120,000.00	30,000.00	350,000.00	2,850,000.00
1952	2,000,000.00	500,000.00	2,500,000.00	120,000.00	30,000.00	80,000.00	20,000.00	250,000.00	2,750,000.00
1953	2,000,000.00	500,000.00	2,500,000.00	80,000.00	20,000.00	40,000.00	10,000.00	150,000.00	2,650,000.00
1954	2,000,000.00	500,000.00	2,500,000.00	40,000.00	10,000.00			50,000.00	2,550,000.00
Total	$20,000,000.00	$9,000,000.00	$29,000,000.00	$9,800,000.00	$3,293,333.33	$9,800,000.00	$3,190,000.00	$26,083,333.33	$55,083,333.33

The following statements represent the amounts due at each retirement and interest paying period on each series of $29,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1926:

TABLE LX—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 1—$4,000,000.00—4% BONDS.

Date of sale—Dec. 30, 1924. Date of issue—Jan. 1, 1925. Rate $97.5575. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925		$53,333.33	$80,000.00	$133,333.33	$133,333.33
1926		80,000.00	80,000.00	160,000.00	160,000.00
1927		80,000.00	80,000.00	160,000.00	160,000.00
1928		80,000.00	80,000.00	160,000.00	160,000.00
1929		80,000.00	80,000.00	160,000.00	160,000.00
1930		80,000.00	80,000.00	160,000.00	160,000.00
1931		80,000.00	80,000.00	160,000.00	160,000.00
1932	$500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1933	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1934	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1935	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1936	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1937	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1938	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1939	500,000.00	10,000.00		10,000.00	510,000.00
Total	$4,000,000.00	$893,333.33	$840,000.00	$1,733,333.33	$5,733,333.33

TABLE LXI—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$10,000,000.00—4% BONDS.

Date of sale—May 20, 1925. Date of issue—Mar. 1, 1925. Rate $99.881. Yield 4.008.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LXII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$10,000,000.00—4% BONDS.

Date of sale—Sept. 1, 1925. Date of issue—Mar. 1, 1925. Rate $96.422. Yield 4.24.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LXIII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$5,000,000.00—4% BONDS.

Date of sale—Feb. 17, 1926. Date of issue—Feb. 1, 1926. Rate $99.062. Yield 4.062.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1926		$ 50,000.00	$100,000.00	$150,000.00	$150,000.00
1927		100,000.00	100,000.00	200,000.00	200,000.00
1928		100,000.00	100,000.00	200,000.00	200,000.00
1929		100,000.00	100,000.00	200,000.00	200,000.00
1930		100,000.00	100,000.00	200,000.00	200,000.00
1931		100,000.00	100,000.00	200,000.00	200,000.00
1932		100,000.00	100,000.00	200,000.00	200,000.00
1933		100,000.00	100,000.00	200,000.00	200,000.00
1934		100,000.00	100,000.00	200,000.00	200,000.00
1935		100,000.00	100,000.00	200,000.00	200,000.00
1936		100,000.00	100,000.00	200,000.00	200,000.00
1937		100,000.00	100,000.00	200,000.00	200,000.00
1938		100,000.00	100,000.00	200,000.00	200,000.00
1939		100,000.00	100,000.00	200,000.00	200,000.00
1940		100,000.00	100,000.00	200,000.00	200,000.00
1941		100,000.00	100,000.00	200,000.00	200,000.00
1942		100,000.00	100,000.00	200,000.00	200,000.00
1943		100,000.00	100,000.00	200,000.00	200,000.00
1944		100,000.00	100,000.00	200,000.00	200,000.00
1945	$500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1946	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1947	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1948	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1949	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1950	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1951	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1952	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1953	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1954	500,000.00	10,000.00		10,000.00	510,000.00
Total	$5,000,000.00	$2,400,000.00	$2,350,000.00	$4,750,000.00	$9,750,000.00

The following statement represents the amount of principal and interest payable each year during the retirement of the $60,000,000.00 Bond Issue plus $29,000,000.00 of the $100,000,000 Bond Issue sold to December 31, 1926:

TABLE LXIV—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF THE $60,000,000.00 AND ON $29,000,000.00 OF THE $100,000,000.00 BOND ISSUE SOLD TO DECEMBER 31, 1926.

Year in which principal is to be retired and interest paid.	Principal of $60,000,000.00 bonds to be retired each year.	Principal of $100,000,000.00 bonds to be retired each year.	Total principal both bond issues to be retired each year.	Interest on $60,000,000.00 bonds to be paid each year.	Interest on $100,000,000.00 bonds to be paid each year.	Total interest on both bond issues to be paid each year.	Total principal and interest both bond issues to be paid each year.
1927	$2,000,000.00		$2,000,000.00	$2,320,000.00	$1,160,000.00	$3,480,000.00	$5,480,000.00
1928	2,000,000.00		2,000,000.00	2,240,000.00	1,160,000.00	3,400,000.00	5,400,000.00
1929	2,000,000.00		2,000,000.00	2,160,000.00	1,160,000.00	3,320,000.00	5,320,000.00
1930	2,000,000.00		2,000,000.00	2,080,000.00	1,160,000.00	3,240,000.00	5,240,000.00
1931	2,000,000.00		2,000,000.00	2,000,000.00	1,160,000.00	3,160,000.00	5,160,000.00
1932	2,000,000.00	$ 500,000.00	2,500,000.00	1,920,000.00	1,150,000.00	3,070,000.00	5,570,000.00
1933	2,000,000.00	500,000.00	2,500,000.00	1,840,000.00	1,130,000.00	2,970,000.00	5,470,000.00
1934	2,000,000.00	500,000.00	2,500,000.00	1,760,000.00	1,110,000.00	2,870,000.00	5,370,000.00
1935	3,000,000.00	500,000.00	3,500,000.00	1,680,000.00	1,090,000.00	2,770,000.00	6,270,000.00
1936	3,000,000.00	500,000.00	3,500,000.00	1,560,000.00	1,070,000.00	2,630,000.00	6,130,000.00
1937	3,000,000.00	500,000.00	3,500,000.00	1,440,000.00	1,050,000.00	2,490,000.00	5,990,000.00
1938	4,000,000.00	500,000.00	4,500,000.00	1,320,000.00	1,030,000.00	2,350,000.00	6,850,000.00
1939	4,000,000.00	500,000.00	4,500,000.00	1,160,000.00	1,010,000.00	2,170,000.00	6,670,000.00
1940	5,000,000.00		5,000,000.00	1,000,000.00	1,000,000.00	2,000,000.00	7,000,000.00
1941	5,000,000.00		5,000,000.00	800,000.00	1,000,000.00	1,800,000.00	6,800,000.00
1942	5,000,000.00		5,000,000.00	600,000.00	1,000,000.00	1,600,000.00	6,600,000.00
1943	5,000,000.00		5,000,000.00	400,000.00	1,000,000.00	1,400,000.00	6,400,000.00
1944	5,000,000.00		5,000,000.00	200,000.00	1,000,000.00	1,200,000.00	6,200,000.00
1945		2,500,000.00	2,500,000.00		950,000.00	950,000.00	3,450,000.00
1946		2,500,000.00	2,500,000.00		850,000.00	850,000.00	3,350,000.00
1947		2,500,000.00	2,500,000.00		750,000.00	750,000.00	3,250,000.00
1948		2,500,000.00	2,500,000.00		650,000.00	650,000.00	3,150,000.00
1949		2,500,000.00	2,500,000.00		550,000.00	550,000.00	3,050,000.00
1950		2,500,000.00	2,500,000.00		450,000.00	450,000.00	2,950,000.00
1951		2,500,000.00	2,500,000.00		350,000.00	350,000.00	2,850,000.00
1952		2,500,000.00	2,500,000.00		250,000.00	250,000.00	2,750,000.00
1953		2,500,000.00	2,500,000.00		150,000.00	150,000.00	2,650,000.00
1954		2,500,000.00	2,500,000.00		50,000.00	50,000.00	2,550,000.00
Total	$58,000,000.00	$29,000,000.00	$87,000,000.00	$26,480,000.00	$24,440,000.00	$50,920,000.00	$137,920,000.00

The following statement represents the principal retirement of the $60,000,000.00 Bond Issue plus $29,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1926:

TABLE LXV—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF PRINCIPAL DUE AT EACH RETIREMENT PERIOD ON THE ENTIRE $60,000,000.00 BOND ISSUE PLUS $29,000,000.00 OF THE $100,000,000.00 BOND ISSUE SOLD TO DECEMBER 31, 1926.

Year in which principal is to be retired.	Principal $60,000,000.00 bonds to be retired Mar. 1 each year.	Principal $100,000,000.00 bonds to be retired Mar. 1 each year.	Total principal both bond issues to be retired Mar. 1.	Principal $60,000,000.00 bonds to be retired May 1 each year.	Principal $100,000,000.00 bonds to be retired May 1 each year.	Total principal both bond issues to be retired May 1.	Total $60,000,000.00 bond principal to be retired each year.	Total $100,000,000.00 bond principal to be retired each year.	Total principal both bond issues to be retired each year.
1927				$2,000,000.00		$2,000,000.00	$2,000,000.00		$2,000,000.00
1928				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1929				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1930				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1931				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1932				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1935				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1934				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1935	$1,000,000.00		$1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1936	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1937	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1938	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1939	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1940	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1941	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1942	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1943	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1944	5,000,000.00		5,000,000.00				5,000,000.00		5,000,000.00
1945		$2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1946		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1947		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1948		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1949		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1950		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1951		2,000,000.00	2,000,000.00		500,000 00	500,000.00		2,500,000.00	2,500,000.00
1952		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1953		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
1954		2,000,000.00	2,000,000.00		500,000.00	500,000.00		2,500,000.00	2,500,000.00
Totals	$30,000,000.00	$20,000,000.00	$50,000,000.00	$28,000,000.00	$9,000,000.00	$37,000,000.00	$58,000,000.00	$29,000,000.00	$87,000,000.00

NOTE.—$2,000,000.00 of the $60,000,000.00 bond issue was retired May 1, 1926.

The following statement shows the arrangement of interest paying periods on the entire $60,000,000.00 Bond Issue plus $29,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1926:

TABLE LXVI—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF INTEREST DUE AT EACH INTEREST PAYING PERIOD ON THE ENTIRE $60,000,000.00 BOND ISSUE PLUS $29,000,000.00 OF THE $100,000,000.00 BOND ISSUE SOLD TO DECEMBER 31, 1926.

Year in which interest is to be paid.	Interest on $60,000,000.00 bonds to be paid Mar. 1 each year.	Interest on $100,000,000.00 bonds to be paid Mar. 1 each year.	Total interest on both bond issues to be paid Mar. 1 each year.	Interest on $60,000,000.00 bonds to be paid May 1 each year.	Interest on $100,000,000.00 bonds to be paid May 1 each year.	Total interest on both bond issues to be paid May 1 each year.	Interest on $100,000,000.00 bonds to be paid Sept. 1 each year.	Interest on $100,000,000.00 bonds to be paid Nov. 1 each year.	Total interest on $60,000,000.00 bond issue to be paid each year.	Total interest on $100,000,000.00 bond issue to be paid each year.	Total interest on both bond issues to be paid each year.
1927	$1,200,000.00	$400,000.00	$1,600,000.00	$1,120,000.00	$180,000.00	$1,300,000.00	$400,000.00	$180,000.00	$2,320,000.00	$1,160,000.00	$3,480,000.00
1928	1,200,000.00	400,000.00	1,600,000.00	1,040,000.00	180,000.00	1,220,000.00	400,000.00	180,000.00	2,240,000.00	1,160,000.00	3,400,000.00
1929	1,200,000.00	400,000.00	1,600,000.00	960,000.00	180,000.00	1,140,000.00	400,000.00	180,000.00	2,160,000.00	1,160,000.00	3,320,000.00
1930	1,200,000.00	400,000.00	1,600,000.00	880,000.00	180,000.00	1,060,000.00	400,000.00	180,000.00	2,080,000.00	1,160,000.00	3,240,000.00
1931	1,200,000.00	400,000.00	1,600,000.00	800,000.00	180,000.00	980,000.00	400,000.00	180,000.00	2,000,000.00	1,160,000.00	3,160,000.00
1932	1,200,000.00	400,000.00	1,600,000.00	720,000.00	180,000.00	900,000.00	400,000.00	170,000.00	1,920,000.00	1,150,000.00	3,070,000.00
1933	1,200,000.00	400,000.00	1,600,000.00	640,000.00	170,000.00	810,000.00	400,000.00	160,000.00	1,840,000.00	1,130,000.00	2,970,000.00
1934	1,200,000.00	400,000.00	1,600,000.00	560,000.00	160,000.00	720,000.00	400,000.00	150,000.00	1,760,000.00	1,110,000.00	2,870,000.00
1935	1,200,000.00	400,000.00	1,600,000.00	480,000.00	150,000.00	630,000.00	400,000.00	140,000.00	1,680,000.00	1,090,000.00	2,770,000.00
1936	1,160,000.00	400,000.00	1,560,000.00	400,000.00	140,000.00	540,000.00	400,000.00	130,000.00	1,560,000.00	1,070,000.00	2,630,000.00
1937	1,120,000.00	400,000.00	1,520,000.00	320,000.00	130,000.00	450,000.00	400,000.00	120,000.00	1,440,000.00	1,050,000.00	2,490,000.00
1938	1,080,000.00	400,000.00	1,480,000.00	240,000.00	120,000.00	360,000.00	400,000.00	110,000.00	1,320,000.00	1,030,000.00	2,350,000.00
1939	960,000.00	400,000.00	1,360,000.00	200,000.00	110,000.00	310,000.00	400,000.00	100,000.00	1,160,000.00	1,010,000.00	2,170,000.00
1940	840,000.00	400,000.00	1,240,000.00	160,000.00	100,000.00	260,000.00	400,000.00	100,000.00	1,000,000.00	1,000,000.00	2,000,000.00
1941	680,000.00	400,000.00	1,080,000.00	120,000.00	100,000.00	220,000.00	400,000.00	100,000.00	800,000.00	1,000,000.00	1,800,000.00
1942	520,000.00	400,000.00	920,000.00	80,000.00	100,000.00	180,000.00	400,000.00	100,000.00	600,000.00	1,000,000.00	1,600,000.00
1943	360,000.00	400,000.00	760,000.00	40,000.00	100,000.00	140,000.00	400,000.00	100,000.00	400,000.00	1,000,000.00	1,400,000.00
1944	200,000.00	400,000.00	600,000.00		100,000.00	100,000.00	400,000.00	100,000.00	200,000.00	1,000,000.00	1,200,000.00
1945		400,000.00	400,000.00		100,000.00	100,000.00	360,000.00	90,000.00		950,000.00	950,000.00
1946		360,000.00	360,000.00		90,000.00	90,000.00	320,000.00	80,000.00		850,000.00	850,000.00
1947		320,000.00	320,000.00		80,000.00	80,000.00	280,000.00	70,000.00		750,000.00	750,000.00
1948		280,000.00	280,000.00		70,000.00	70,000.00	240,000.00	60,000.00		650,000.00	650,000.00
1949		240,000.00	240,000.00		60,000.00	60,000.00	200,000.00	50,000.00		550,000.00	550,000.00
1950		200,000.00	200,000.00		50,000.00	50,000.00	160,000.00	40,000.00		450,000.00	450,000.00
1951		160,000.00	160,000.00		40,000.00	40,000.00	120,000.00	30,000.00		350,000.00	350,000.00
1952		120,000.00	120,000.00		30,000.00	30,000.00	80,000.00	20,000.00		250,000.00	250,000.00
1953		80,000.00	80,000.00		20,000.00	20,000.00	40,000.00	10,000.00		150,000.00	150,000.00
1954		40,000.00	40,000.00		10,000.00	10,000.00				50,000.00	50,000.00
Totals	$17,720,000.00	$9,400,000.00	$27,120,000.00	$8,760,000.00	$3,110,000.00	$11,870,000.00	$9,000,000.00	$2,930,000.00	$26,480,000.00	$24,440,000.00	$50,920,000.00

3. PERMITS, FRANCHISES, LEASES AND RENTALS.—All requests for permits or franchises for the use of the State highways for the construction of entrances to private properties, gasoline filling stations, lunch stands and to companies and corporations for the privilege of placing and maintaining telephone and telegraph lines, electric power transmission lines, water mains, cables, conduits, and sewers are carefully investigated in this Bureau as to their legal aspects before being finally approved by the Chief Highway Engineer. During 1926, 1,707 permits of this nature were handled.

All arrangements for the renting or leasing of grounds or buildings used by the various sections of the Division of Highways are made by this Bureau and records are kept of such properties.

4. CLAIMS, LIENS AND ASSIGNMENTS.—All liens, claims and assignments filed against contractors covering labor, material or equipment furnished by outside parties are received, recorded and filed in this office. A detailed record of such claims against each contractor for each section of work under contract is kept on file and arrangements are made for taking care of such claims before settlement is made with the contractors.

5. REFUNDS TO COUNTIES.—The following statement shows the amounts appropriated, refunded and lapsed under House Bill No. 766, Refunds to Counties:

TABLE LXVII—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 766.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bond	$114,837.53	$114,837.53	
Boone	3,937.34		$ 3,937.34
Bureau	6,836.42		6,836.42
Cass	5,851.17		5,851.17
Champaign	74,453.33	22,629.13	51,824.20
Clark	126,259.34	126,258.68	.66
Clinton	6,745.00		6,745.00
Coles	36,876.16		36,876.16
Cook	687,935.42	498,954.97	188,980.45
Crawford	10,014.12		10,014.12
Cumberland	94,209.05	92,312.41	1,896.64
DeKalb	51,509.00	51,509.00	
Douglas	8,993.93		8,993.93
DuPage	82,042.00	82,042.00	
Edgar	1,577.20		1,577.20
Edwards	1,498.69		1,498.69
Effingham	106,181.45	98,590.35	7,591.10
Fayette	160,526.53	147,258.26	13,268.27
Fulton	28,585.10		28,585.10
Iroquois	65,788.51	65,788.39	.12
Jasper	3,350.74		3,357.40
Jefferson	4,168.35		4,168.35
Kane	113,639.55	113,639.55	
Kankakee	13,239.47	13,239.47	
Lake	143,681.62	143,681.62	
Lawrence	6,373.44		6,373.44
Lee	75,726.00	75,708.81	17.19
Livingston	13,119.87		13,119.87
Logan	3,058.65		3,058.65
Macoupin	73,176.31	17,495.88	55,680.43
Madison	206,032.34	174,200.20	31,832.14
Mason	55,882.46		55,882.46
Menard	51,117.01		51,117.01
Mercer	3,870.00		3,870.00

TABLE LXVII—Concluded.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Monroe	$ 7,035.04		$ 7,035.04
Morgan	7,996.07		7,996.07
Ogle	47,816.63	$ 12,597.86	35,218.77
Peoria	69,285.00	69,043.80	241.20
Piatt	21,027.69		21,027.69
Rock Island	4,650.54		4,650.54
St. Clair	84,210.92	84,210.92	
Sangamon	131,067.24	123,457.62	7,609.62
Schuyler	14,033.49		14,033.49
Stephenson	20,571.79		20,571.79
Tazewell	145,468.89	132,835.12	12,633.77
Vermilion	651,044.41	544,156.60	106,887.81
Warren	41,142.06	31,470.74	9,671.32
Whiteside	75,460.88	73,622.25	1,838.63
Will	21,521.00	16,600.68	4,920.32
Williamson	62,392.88		62,392.88
Winnebago	43,594.60	43,594.60	
Total	$3,889,382.23	$2,969,736.44	$919,645.79

The following statement represents the amounts appropriated, refunded and lapsed under House Bill No. 867, Refunds to Counties:

TABLE LXVIII—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 867.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bureau	$ 6,055.66		$ 6,055.66
Carroll	15,090.56		15,090.56
Clinton	6,745.00		6,745.00
Coles	7,869.21		7,869.21
Cook	492,675.23	18,268.01	474,407.22
DeKalb	60,841.26	3,450.76	57,390.50
Edgar	15,298.92		15,298.92
Franklin	10,493.36		10,493.36
Fulton	8,030.00		8,030.00
Grundy	75,252.00	50,000.00	25,252.00
Jackson	5,909.92		5,909.92
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	84,480.35	72,448.07	12,032.28
Kankakee	62,881.21	62,881.21	
Lake	388,961.15	337,156.27	51,804.88
LaSalle	114,736.57		114,736.57
Lawrence	19,757.21		19,757.21
Lee	25,004.86		25,004.86
Livingston	13,912.26		13,912.26
McHenry	10,647.17		10,647.17
Macoupin	127,876.00		127,876.00
Madison	389,115.77	234,129.24	154,986.53
Marshall	4,307.27		4,307.27
Menard	58,894.30	25,000.00	33,894.30
Ogle	26,288.20		26,288.20
Peoria	170,329.32		170,329.32
Rock Island	15,558.05		15,558.05
St. Clair	133,153.61	118,506.05	14,647.56
Sangamon	164,639.00	156,009.58	8,629.42
Shelby	18,573.03		18,573.03
Whiteside	4,732.04		4,732.04
Will	183,290.57	165,712.27	17,578.30
Winnebago	124,196.40	70,323.39	53,873.01
Total	$2,869,289.87	$1,313,884.85	$1,555,405.02

The following statement shows the amounts appropriated, refunded and lapsed under House Bill No. 822, Refunds to Counties:

TABLE LXIX—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 822.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1925.
Adams	$ 16,256.06	--------	$ 16,256.06
Bond	4,438.92	$ 4,438.92	--------
Boone	3,762.32	3,762.32	--------
Bureau	12,894.26	12,854.54	39.72
Carroll	10,024.77	6,551.10	3,473.67
Cass	5,851.17	--------	5,851.17
Champaign	51,746.58	48,535.18	3,211.40
Coles	33,738.22	32,480.92	1,257.30
Cook	984,393.21	720,389.28	264,003.93
Cumberland	6,261.78	--------	6,261.78
DeKalb	58,192.39	23,381.70	34,810.69
DuPage	45,207.17	40,858.47	4,348.70
Edgar	16,876.12	14,148.08	2,728.04
Edwards	1,498.69	--------	1,498.69
Effingham	5,656.37	3,918.26	1,738.11
Ford	5,738.29	--------	5,738.29
Fulton	33,123.80	32,540.30	583.50
Grundy	55,734.87	30,734.87	25,000.00
Iroquois	18,843.00	--------	18,843.00
Jersey	2,930.72	--------	2,930.72
Kane	393,922.37	165,972.21	227,950.16
Kankakee	21,044.78	17,968.30	3,076.48
LaSalle	27,281.15	--------	27,281.15
Lake	214,144.81	85,625.17	128,519.64
Lee	25,004.86	25,004.86	--------
Livingston	19,160.77	19,160.77	--------
Logan	1,166.42	--------	1,166.42
Macon	1,618.85	--------	1,618.85
Macoupin	162,902.24	162,406.36	495.88
Madison	302,991.28	172,847.39	130,143.89
Marion	1,593.66	--------	1,593.66
Marshall	45,601.86	--------	45,601.86
Mason	54,066.22	54,066.22	--------
McHenry	10,191.63	--------	10,191.63
Menard	44,773.74	26,242.44	18,531.30
Mercer	3,870.00	--------	3,870.00
Monroe	7,035.04	1,000.00	6,035.04
Morgan	7,966.07	--------	7,966.07
Ogle	78,613.10	64,767.39	13,845.71
Peoria	122,739.77	80,818.16	41,921.61
Piatt	11,235.62	11,235.62	--------
Pike	8,325.16	--------	8,325.16
Putnam	19,073.92	7,000.00	12,073.92
Rock Island	3,029.82	--------	3,029.82
Schuyler	17,583.40	6,929.94	10,653.46
Shelby	17,366.56	--------	17,366.56
St. Clair	483,564.11	483,339.78	224.33
Stephenson	12,838.53	12,838.53	--------
Tazewell	12,633.48	--------	12,633.48
Vermilion	155,526.79	--------	155,526.79
Warren	38,405.66	--------	38,405.66
Whiteside	4,732.04	4,732.04	--------
Will	194,128.06	100,340.09	93,787.97
Williamson	66,863.40	55,169.70	11,693.70
Winnebago	61,468.68	61,468.68	--------
Total	$4,025,632.56	$2,593,527.59	$1,432,104.97

The following statement shows the amounts appropriated for Refunds to Counties for their share of cost of sections incorporated in the State Bond Issue system under Senate Bill No. 515:

TABLE LXX—STATEMENT SHOWING AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, SENATE BILL 515.

County.	Amount appropriated.	Amounts refunded.	Balance Dec. 31, 1926.
Adams	$ 16,256.07		$ 16,256.07
Carroll	4,000.00	$ 3,145.84	854.16
Cass	3,450.54	3,450.54	
Coles	1,888.97	1,888.97	
Cook	505,985.35		505,985.35
Douglas	2,949.33	2,949.33	
Edwards	1,498.69	1,498.69	
Effingham	6,297.35	5,058.90	1,238.45
Ford	5,738.29		5,738.29
Fulton	32,540.30		32,540.30
Iroquois	7,498.00		7,498.00
Jackson	942.00		942.00
Jefferson	1,125.28		1,125.28
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	248,924.77	180,296.18	68,628.59
Kankakee	147,419.17		147,419.17
Lake	50,000.00	41,625.86	8,374.14
LaSalle	21,566.89		21,566.89
Lee	25,004.86		25,004.86
Livingston	26,445.09	7,421.01	19,024.08
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Madison	23,054.63	22,463.23	591.40
Marion	1,895.40		1,895.40
Marshall	45,598.82		45,598.82
Mason	63,814.17		63,814.17
McHenry	10,161.59		10,161.59
McLean	47,356.52		47,356.52
Menard	3,531.30		3,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.03	6,035.03	1,000.00
Morgan	7,966.07	7,966.07	
Peoria	46,529.39	44,467.72	2,061.67
Piatt	11,235.62		11,235.62
Pike	8,066.39		8,066.39
Putnam	19,073.92	12,000.00	7,073.92
Rock Island	2,746.47		2,746.47
Sangamon	572,109.87		572,109.87
Schuyler	25,802.02		25,802.02
Shelby	17,554.03		17,554.03
St. Clair	449,998.24	131,113.84	318,884.40
Stephenson	7,726.37		7,726.37
Tazewell	12,633.48		12,633.48
Will	109,415.59	109,415.59	
Williamson	52,133.40		52,133.40
Vermilion	19,500.00		19,500.00
Total	$2,704,818.95	$580,796.80	$2,124,022.15

6. DISTRIBUTION OF CEMENT TO STATE CONTRACTS.—During the calendar year 1926 the State contracted for 2,350,000 barrels of cement of which 1,399,174 barrels were shipped to the various construction jobs throughout the State.

The payment of all cement furnished for State road work is handled in this Bureau where a record and follow up system for final disposition of cars is kept and a final check is made with the laboratory and district engineer on shipments and transfers to and from the various construction sections.

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

CORNELIUS R. MILLER, *Director*
FRANK T. SHEETS, *Chief Highway Engineer*

TENTH ANNUAL REPORT
-- of --
DIVISION OF HIGHWAYS

January 1, 1927
-- to --
December 31, 1927

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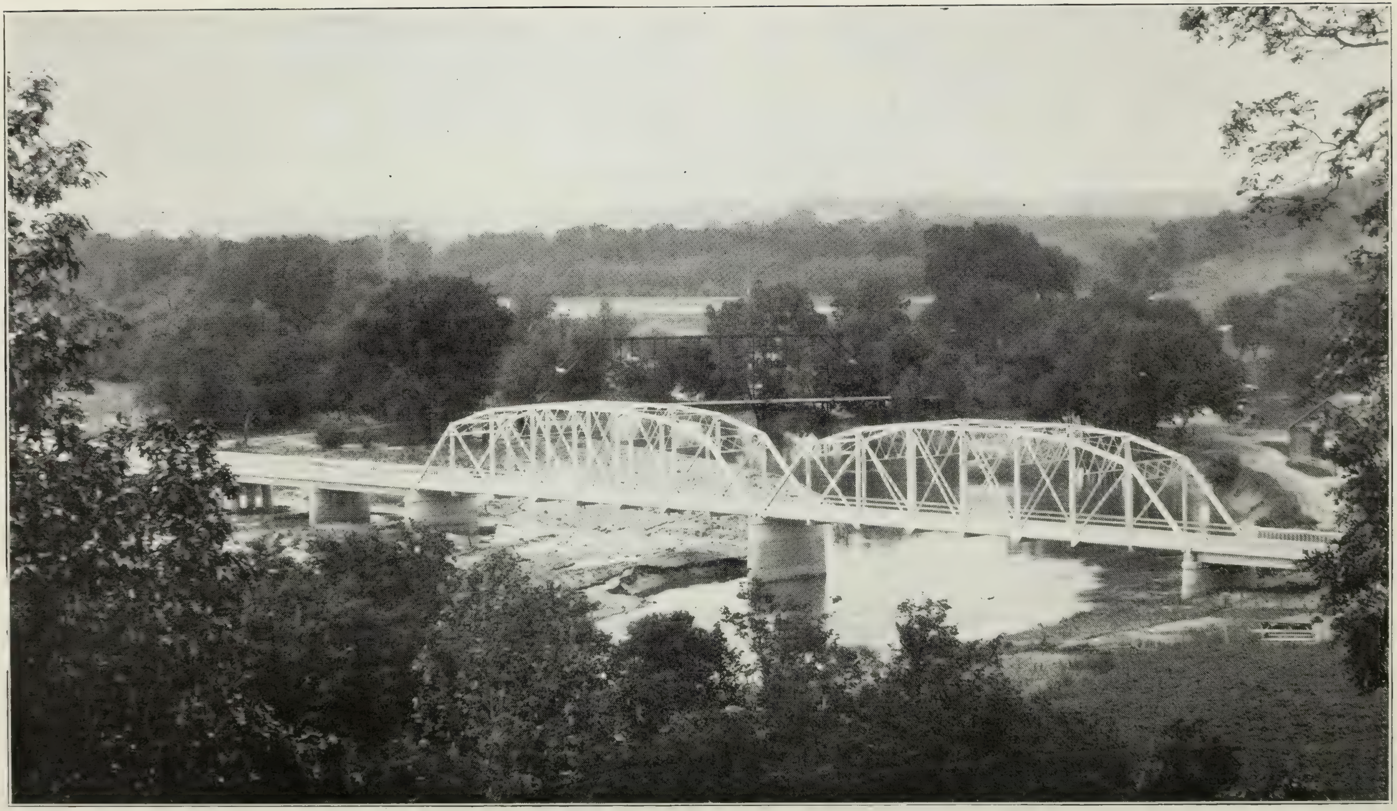
TENTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

DIVISION OF HIGHWAYS



Spoon River Bridge on Bond Route 9 near Blyton.

TENTH ANNUAL REPORT

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS.

CORNELIUS R. MILLER, *Director.*

DON GARRISON, *Assistant Director.*

DIVISION OF HIGHWAYS.

FRANK T. SHEETS, *Chief Highway Engineer and Acting Superintendent of Highways.*

R. R. BENEDICT, *Assistant Chief Highway Engineer.*

BUREAU CHIEFS.

H. E. SURMAN, *Engineer of Design.*

G. F. BURCH, *Engineer of Bridges.*

C. M. HATHAWAY, *Engineer of Construction.*

FRED TARRANT, *Engineer of Maintenance.*

V. L. GLOVER, *Engineer of Materials.*

J. M. MCCOY, *Chief Clerk.*

DISTRICT ENGINEERS.

District No. 1—G. N. LAMB, Elgin, Ill.
District No. 2—O. F. GOEKE, Dixon, Ill.
District No. 3—M. J. FLEMING, Ottawa, Ill.
District No. 4—THEO. PLACK, Peoria, Ill.
District No. 5—CHAS. H. APPLE, Paris, Ill.
District No. 6—K. N. EVANS, Springfield, Ill.
District No. 7—P. F. JERVIS, Effingham, Ill.
District No. 8—C. M. SLAYMAKER, E. St. Louis, Ill.
District No. 9—L. SCHWARTZ, Carbondale, Ill.

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CONTENTS.

PAGE.

I. GENERAL 1

II. BUREAU OF DESIGN 5

A. ROAD SECTION 5
1. General 5
2. Reconnaissance Surveys 5
3. Surveys and Plans 5
4. Contracts Awarded 5
5. Refunds to Cities 8
6. Unit Prices 9
7. Changes in Design Policies 9
8. Wider Pavements 12
9. Pavement Cross Sections 12
10. Federal Aid 12
11. State Aid 18
12. Grade Separations 19

B. BRIDGE SECTION 22
1. General 22
2. Plans Prepared 23
3. Contracts Awarded 23
4. Overhead Grade Separations 23
5. Classification of Bridge Work 24
6. Bridges Completed 24
7. Bridges Under Construction 25

III. BUREAU OF CONSTRUCTION 33
1. Duties of the Bureau 33
2. 1927 Construction Program 33
3. Quantity and Quality of Concrete 34
4. Cement Shipments 35
5. Day Labor Construction 35
6. Penitentiary Stone 36
7. Freight Rate Division 36
8. Charts and Tables 36

IV. BUREAU OF MAINTENANCE 56
1. General 56
2. Outline of Activities 56
3. Permits and Franchises 56
4. Flood Conditions Encountered During 1927 57
5. Right of Way Posts 57
6. Route Bulletin 57
7. Cost Accounting 57
8. Snow Removal 68
9. Maintenance of Surfaced Roads 71
10. Maintenance of Large Bridges 91
11. Maintenance of Detours, Unpaved and Temporary Routes 91
12. Additions and Betterments 98
13. Policing of the State Highway System 99

V. BUREAU OF MATERIALS 101
1. General 101
2. General Office 101
3. Specifications 101
4. Laboratory Inspection of Materials 101
5. Field Inspection of Materials 103
6. Inspection of New Material Deposits 107
7. Inspection of Seed for Maintenance Work 108
8. Research and Investigations 108
9. Preparation of Reports and Bulletins 110
10. Departmental Service 112

VI. BUREAU OF AUDITS 115
1. Accounting and Auditing 115
2. Reports and Financial Statements 115
3. Permits, Franchises, Leases and Rentals 148
4. Claims, Liens and Assignments 148
5. Refunds to Counties 148
6. Distribution of Cement to State Contracts 152

TABLES.

No. Page.
I. Federal Aid and State Bond Issue Contracts Awarded 6
II. 15d Contracts Awarded 6
III. Contracts Awarded for County 15d Work in 1927 7
IV. Contracts Awarded Under House Bill 433 8
V. Refunds to Cities 9
VI. Federal Aid Allotments 12
VII. Status of Federal Aid, January 1, 1928 16
VIII. Status of State Aid Mileage 18
IX. Grade Separation, Cases Settled January 1, 1919 to January 1, 1928 20
X. A Summary of the County and State Bridge Work Carried on from 1906 to 1927, inclusive 23
XI. Shipments of Stone from the Penitentiaries 36
XII. General Summary of 1927 Construction 37
XIII. Summary of Different Types of Improved Roads Constructed in 1927 37
XIV. Total Mileage of Pavement Available to Traffic in Each County—January 1, 1928 41
XV. Trial Balance Coverings Transactions of the Bureau of Maintenance for the Calendar Year 1927 58
XVI. Statement Showing Cost of Snow Removal for the Northern, Central and Southern Zones for the Calendar Year 1927 70
XVII. Statement Showing Cost of Marking Routes Through Cities in All Districts for the Calendar Year 1927 81
XVIII. Statement Showing Comparison of Mileages and Costs on Per Mile Basis by Types and Units for the Calendar Year 1927 82
XIX. Statement Showing Comparison of Miles and Cost of Various Types Maintained During the Calendar Year 1927 83
XX. Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Surfaced Roads Maintained on a Calendar Year Basis for 1927 in All Districts 84
XXI. Consolidated Statement Showing Cost of Maintenance and Upkeep of 5,451.71 Miles of Concrete Roads in All Districts for the Calendar Year 1927 85
XXII. Consolidated Statement Showing Cost of Maintenance and Upkeep of 165.49 Miles of Brick Roads in All Districts for the Calnedar Year 1927 86
XXIII. Consolidated Statement Showing Cost of Maintenance and Upkeep of 51.30 Miles of Bit. Concrete Roads in All Districts for the Calendar Year 1927 87
XXIV. Consolidated Statement Showing Cost of Maintenance and Upkeep of 25.85 Miles of Bit. Macadam Roads in All Districts for the Calendar Year 1927 88
XXV. Consolidated Statement Showing Cost of Maintenance and Upkeep of 39.27 Miles of W. B. Macadam Roads in All Districts for the Calendar Year 1927 89
XXVI. Consolidated Statement Showing Cost of Maintenance and Upkeep of 163.86 Miles of Gravel Roads in All Districts for the Calendar Year 1927 90
XXVII. Statement Showing Cost of Maintenance and Upkeep of Bridges over 100 Foot Span Located in the Various Districts for the Calendar Year 1927 93
XXVIII. Consolidated Statement Showing the Cost of Maintenance and Upkeep on All Types of Detours, Unpaved and Temoprary Routes for the Calendar Year 1927 94
XXIX. Statement Showing Comparison of Miles and Cost of Various Types of Detour Roads Maintained During the Calendar Year 1927 95
XXX. Statement Showing Comparison of Mileages and Costs on Per Mile Basis for Detour Roads by Types and Units for the Calendar Year 1927 96

No. PAGE.

XXXI. Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Detour Roads Maintained on a Calendar Year Basis for 1927 in All Districts 97

XXXII. Statement Showing Cost of Additions and Betterments for the Calendar Year 1927 98

XXXIII. Annual Report of State Highway Patrol Officers for the Year 1927. 99

XXXIV. Number of Samples Tested in the Springfield Laboratory for Highway Work in Illinois 102

XXXV. Number of Samples Tested in the Springfield Laboratory for the Illinois Department of Purchases and Construction 103

XXXVI. Quantity of Materials Accepted and Unit Cost of Inspection for the Calendar Year 1927 104

XXXVII. Quantity of Materials Inspected for Other Departments of the State of Illinois and for Other States During the Calendar Year 1927 105

XXXVIII. Number of Films, Prints and Slides Prepared for the Various Bureaus During 1927 113

XXXIX. Paint Handled by Bureau of Materials During the Calendar Year 1927 114

XL. Statement Showing Collections of the Division of Highways and Sources from which Collected from January 1, 1927, to December 31, 1927 115

XLI. Road Fund Revenue Deposited in State Treasury from 1911 to 1927, inclusive 118

XLII. List of Appropriations Payable from Road Fund by the General Assembly for the Years 1913 to 1927, inclusive 120

XLIII. Statement Showing Expenditures from the Road Fund for the Years 1914 to 1927, inclusive 121

XLIV. Statement Showing Motor Fee Receipts and Registration of Motor Vehicles for the Years 1911 to 1927, inclusive 124

XLV. Statement Showing Motor Fee Receipts by Months for the Years 1924, 1925, 1926 and 1927 124

XLVI. Statement Showing Motor Fees Collected by Counties for the Years 1924, 1925, 1926 and 1927 125

XLVII. Statement Showing Federal Aid Funds Allotted to Illinois by the U. S. Government, 1917 to 1929, inclusive 126

XLVIII. Statement Showing Bond Fund Revenue Deposited with the State Treasurer as Derived from the Sale of $60,000,000 Bond Issue 127

XLIX. Statement Showing Appropriations Payable from the $60,000,000 Bond Issue Funds 127

L. Statement Showing Expenditures from $60,000,000 Bond Issue from 1921 to 1924, inclusive 127

LI. Statement Showing the Amount of Principal to be Retired and Interest Paid on All Series of the $60,000,000 Bond Issue 130

LII. Statement Showing the Retirement and Interest Payments of Series No. 1, $5,000,000 Bonds of the $60,000,000 Bond Issue Sold October 25, 1921 130

LIII. Statement Showing the Retirement and Interest Payments of Series No. 2, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold April 13, 1922 131

LIV. Statement Showing the Retirement and Interest Payments of Series No. 3, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold September 18, 1922 131

LV. Statement Showing the Retirement and Interest Payments of Series No. 4, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold February 20, 1923 132

LVI. Statement Showing the Retirement and Interest Payments of Series No. 5, $7,000,000 Bonds of the $60,000,000 Bond Issue Sold May 25, 1923 132

LVII. Statement Showing the Retirement and Interest Payments of Series No. 6, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold October 16, 1923 133

LVIII. Statement Showing the Retirement and Interest Payments of Series No. 7, $6,000,000 Bonds of the $60,000,000 Bond Issue Sold December 22, 1923 133

LIX. Statement Showing the Retirement and Interest Payments of Series No. 8, $9,000,000 Bonds of the $60,000,000 Bond Issue Sold June 3, 1924 134

LX. Statement Showing the Retirement and Interest Payments of Series No. 9, $9,000,000 Bonds of the $60,000,000 Bond Issue Sold August 15, 1924 134

No. Page.

LXI. Statement Showing Bond Fund Revenue Derived from the Sale of $41,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1927 135

LXII. Statement Showing Appropriations Payable from the $100,000,000 Bond Issue Fund 135

LXIII. Statement Showing the Expenditures from the $100,000,000 Bond Issue Fund, 1925 to 1927, inclusive 135

LXIV. Statement Showing Highway Bond Retirement and Interest Calculations on All Series of $41,000,000 of the $100,000,000 Bond Issue, 4% Bonds Sold to December 31, 1927 138

LXV. Statement Showing the Retirement and Interest Payments of Series No. 1, $4,000,000 Bonds of the $100,000,000 Bond Issue Sold December 30, 1924 139

LXVI. Statement Showing the Retirement and Interest Payments of Series No. 2, $10,000,000 Bonds of the $100,000,000 Bond Issue Sold May 20, 1925 139

LXVII. Statement Showing the Retirement and Interest Payments of Series No. 3, $10,000,000 Bonds of the $100,000,000 Bond Issue Sold September 1, 1925 140

LXVIII. Statement Showing the Retirement and Interest Payments of Series No. 4, $5,000,000 Bonds of the $100,000,000 Bond Issue Sold February 17, 1926 141

LXIX. Statement Showing the Retirement and Interest Payments of Series No. 5, $6,000,000 Bonds of the $100,000,000 Bond Issue Sold April 26, 1927 142

LXX. Statement Showing the Retirement and Interest Payments of Series No. 6, $6,000,000 Bonds of the $100,000,00 Bond Issue Sold October 11, 1927 143

LXXI. Statement Showing Highway Bond Retirement and Interest Calculations on All Series of the $60,000,000 and on $41,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1927 144

LXXII. Statement Showing Highway Bond Retirement and Interest Calculations, Showing the Amount Due at Each Retirement Period on the Entire $60,000,000 Bond Issue Plus $41,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1927 145

LXXIII. Statement Showing Highway Bond Retirement and Interest Calculations, Showing the Amount Due at Each Retirement Period on the Entire $60,000,000 Bond Issue Plus $41,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1927 146

LXXIV. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 766 148

LXXV. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 867 149

LXXVI. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 822 150

LXXVII. Statement Showing Amounts Appropriated, Refunded and Lapsed Under House Bill 515 151

LXXVIII. Statement Showing Amounts Refunded to Counties from Appropriation of $3,000,000 under Senate Bill 395 152

ILLUSTRATIONS.

FIG. PAGE.

Spoon River bridge on Bond Route 9 near Blyton.... Frontispiece

1. As Illinois looked January 1, 1921.... 2
2. As Illinois looked January 1, 1928.... 3
3. Chart showing mileage of pavement completed by years from 1914 to 1927, inclusive.... 4
4. Graphs showing unit price range on principal items in highway construction during 1927.... 10
5. Graphs showing unit price range on principal items in highway construction, 1919 to 1927.... 11
6. Typical cross sections in use January 1, 1927, to December 31, 1927.... 14
7. Typical cross sections in use January 1, 1927, to December 31, 1927.... 15
8. Proposed Illinois River Bridge at Pekin.... 26
9. Grade separation structure over tracks of Indiana Harbor Belt Railroad at Riverdale.... 27
10. Grade separation structure over tracks of B. & O., C. & E. I. and I. C. Railroads at Tuscola.... 27
11. Fox River bridge at Yorkville.... 28
12. Sangamon River bridge at Petersburg.... 28
13. Fox River bridge at McHenry.... 29
14. Illinois River bridge at LaSalle. Construction view taken in Spring of 1928.... 29
15. Illinois River bridge at LaSalle.... 30
16. Illinois River bridge at Florence.... 31
17. Construction view of Illinois River bridge at Florence on Bond Route 36.. 32
18. Curves showing progress of pavement construction during 1927, in comparison with previous years.... 38
19. Curve showing weekly progress in pavement construction in 1927.... 39
20. Cost analysis diagram of 18-foot concrete pavement.... 40
21. Cost analysis diagram of 18-foot concrete pavement for the years 1922 to 1927, inclusive.... 40
22. A typical progress chart used on pavement construction.... 44
23. Construction of a Concrete Pavement: Moving dirt with elevating grader and teams.... 45
24. Construction of a Concrete Pavement: Moving dirt with steam shovel and crawler dump wagons.... 45
25. Construction of a Concrete Pavement: Setting forms ahead of mixer.... 46
26. Construction of a Concrete Pavement: Cutting subgrade to proper depth and shape.... 46
27. Construction of a Concrete Pavement: Loading and proportioning aggregate.... 47
28. Construction of a Concrete Pavement: Placing mixed concrete.... 47
29. Construction of a Concrete Pavement: Mechanical finishing.... 48
30. Construction of a Concrete Pavement: The final belting.... 48
31. Construction of a Concrete Pavement: Typical cores taken from pavement work.... 49
32. Widening old 10-foot pavement.... 49
33. The new standard 11-foot shoulders.... 50
34. C. & I. M. subway on Bond Routes 4 and 24 near Springfield.... 50
35. Before Construction: Bond Route 5, Section 25.... 51
36. After Construction: Bond Route 5, Section 25.... 51
37. Before Construction: Bond Route 5, Section 30.... 52
38. After Construction: Bond Route 5, Section 30.... 52
39. Before Construction: Bond Route 16, Section 5A.... 53

FIG. PAGE.
40. After Construction: Bond Route 16, Section 5A........................ 53
41. Before Construction: Bond Route 3, Section 5........................ 54
42. After Construction: Bond Route 3, Section 5........................ 54
43. Before Construction: Bond Route 24, Section 6, 8.................... 55
44. After Construction: Bond Route 24, Section 6, 8..................... 55
45. Chart showing division of costs of Bureau of Maintenance according to activities for the calendar year 1927........................ 59
46. Chart showing source of expenditures and total cost of the Bureau of Maintenance for the calendar year 1927........................ 60
47. Chart showing division of mileage of surfaced roads maintained for the calendar year 1927........................ 61
48. Chart showing division of costs of the Bureau of Maintenance by classification of work on surfaced roads for the calendar year 1927.......... 62
49. Chart showing division of costs of the Bureau of Maintenance on surfaced roads by cost components for the calendar year 1927.................. 63
50. Chart showing division of costs of the Bureau of Maintenance by classification of work on 5,451.71 miles of P. C. concrete roads for the calendar year 1927 64
51. Chart showing division of costs of the Bureau of Maintenance by classification of work on 165.49 miles of brick roads for the calendar year 1927 65
52. Chart showing division of mileage of detour roads maintained for the calendar year 1927........................ 66
53. Chart showing division of costs of maintaining detours, unpaved and temporary routes for the calendar year 1927........................ 67
54. Chart showing division of costs of the Bureau of Maintenance on detours, unpaved and temporary routes by cost components for the calendar year 1927 68
55. Map showing the depth of snowfall by sections for the calendar year 1927. 69
56. Maintenance crew blacktopping low spot in pavement.................. 71
57. A portable crane operated by maintenance crew........................ 72
58. Maintenance crew mowing shoulders........................ 72
59. Traffic line machine........................ 74
60. View of State road showing center line made with traffic line machine.... 74
61. Typical roadside route marker........................ 76
62. Typical telephone pole route marker........................ 76
63. Typical city objective and distance marker........................ 76
64. Typical city cross street stop marker........................ 76
65. Typical city limits objective and distance marker........................ 77
66. Typical city limits population marker........................ 77
67. Typical route junction marker........................ 77
68. Typical square warning marker........................ 77
69. Typical diamond-shaped warning marker........................ 78
70. Typical octagonal shaped warning marker........................ 78
71. Typical grade crossing warning markers........................ 78
72. Typical government M-3 shield which is for general use................ 79
73. Typical government M-23 shield which is for cities only................ 79
74. Typical government D-4 shield which is for junction of routes........... 79
75. Map showing location of Federal routes through Illinois................. 80
76. Maintenance crew painting bridge........................ 92
77. Maintenance crew building gutter section........................ 98
78. Chart showing division of costs of highway police officers for the calendar year 1927 100
79. Void-bulkmeter, showing sifting of materials........................109
80. Side view of six-wheel truck, loaded........................111
81. Loading apparatus used to apply heavy static loads on the edge of pavement 111
82. Apparatus used to measure fibre deformations and deflections of pavement.112
83. Chart showing division of revenues by funds, 1911 to 1927, inclusive......116
84. Chart showing division of the combined expenditures from the road fund, $60,000,000 Bond Fund and $100,000,000 Bond Fund, 1914 to 1927, inclusive 117
85. Chart showing division of road fund revenues exclusive of gas tax, 1911 to 1927, inclusive........................119

FIG. PAGE.
86. Chart showing division of road fund expenditures 1914 to 1927, inclusive..123
87. Chart showing proceeds of sales of $60,000,000 Bond Issue by years 1921 to 1924, inclusive....128
88. Chart showing division of expenditures of funds derived from the sale of the $60,000,000 Bond Issue, 1921 to 1924, inclusive....129
89. Chart showing proceeds from the sale of $41,000,000 of the $100,000,000 Bond Issue by years 1924 to 1927, inclusive....136
90. Chart showing division of expenditures of funds derived from the sale of $41,000,000 of the $100,000,000 Bond Issue, 1925 to 1927, inclusive......137
91. Chart showing annual principal and interest payments for the $60,000,000 and for $41,000,000 of the $100,000,000 Bond Issue sold to December 31, 1927 147

DIVISION OF HIGHWAYS.

FRANK T. SHEETS, *Chief Highway Engineer.*

I. GENERAL.

This report, which is a summary of the work accomplished by the Division of Highways during the calendar year ending December 31, 1927, is submitted as a part of the Administrative Report required under Section 25 of the Civil Administrative Code.

The executive officers of the Division of Highways are the Superintendent of Highways and the Chief Highway Engineer. They are assisted by the Assistant Chief Highway Engineer and the following Bureau Chiefs, all of whom are located in Springfield: Engineer of Design, Engineer of Bridges, Engineer of Construction, Engineer of Materials, Engineer of Maintenance, Chief Clerk. The work of the Division is handled through the Bureaus of Design, Construction, Materials, Maintenance and Audits, each of which is in charge of a Bureau Chief. The Bureau of Design consists of a Road Section and a Bridge Section, the latter being in direct charge of the Engineer of Bridges. The field activities are under the supervision of nine District Engineers, who work under the general direction of the executive officers and the Bureau Chiefs.

Since 1914 there has been constructed directly by the Division of Highways or under its supervision, a total of 6689.34 miles of hard-surfaced roads. Of this mileage 5495.20 miles or approximately 82 per cent have been completed since 1921. The pavement completed on the State bond issue systems from January 1, 1921 to January 1, 1928 is shown on the maps, Figures 1 and 2. Figure 3 gives the mileage of pavement completed by years from 1914 to 1927 inclusive. This includes the mileage built directly by the Division of Highways and that built under its supervision by the counties.

In the Eighth and Ninth Annual Reports, mention was made of the legal difficulties encountered in the completion of the $60,000,000 Bond Issue System. Because of these difficulties, it was impossible to start work on the $100,000,000 Bond Issue System during 1926, and as a result of this handicap, only 463.74 miles of pavement were constructed during that year, including the work done by the counties. Late in 1926, however, these difficulties were surmounted, making it possible to start the work during 1927. The first contracts were let on February 11, 1927, and the first pavement was laid on May 17, 1927. It was not possible, however, to complete a large program during 1927, for the reason that only a small amount of work was under contract at the start of the season. In order to complete a 1,000 mile program during one season, it is necessary to have a large proportion of the mileage under contract before the start of the construction season. Since no contracts could be let during 1926, this was not possible, and as a result, the Division could only complete 521.37 miles on the State bond issue systems during 1927. In addition to this mileage, the counties completed 134.15 miles under State supervision, making the total for the year 655.52 miles. Of this total, 631.06 miles were Portland cement concrete, 10.88 miles brick surfacing on a concrete base, 1.00 mile sheet asphalt, and 12.58 miles macadam and gravel. In addition, there

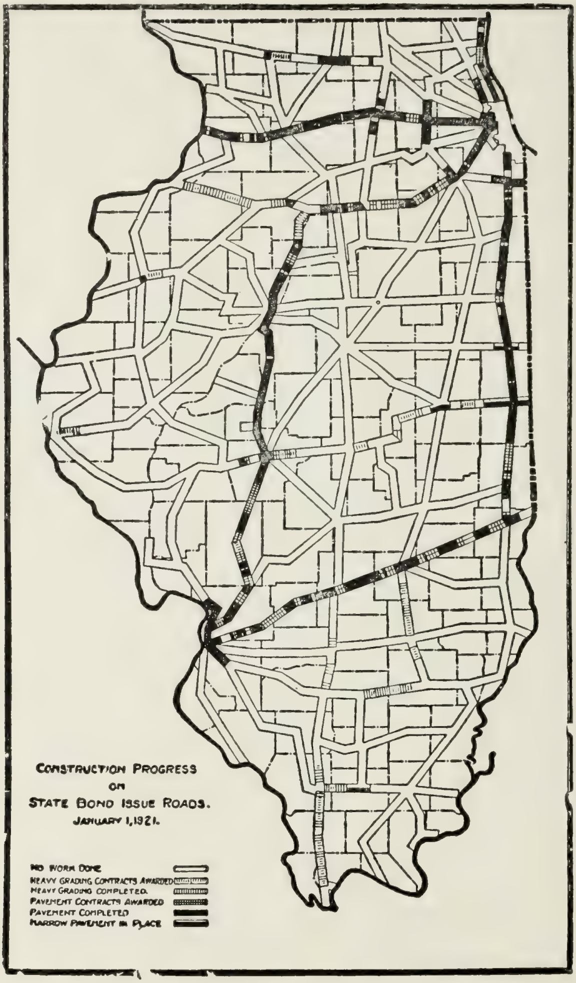


Figure 1.—As Illinois looked January 1, 1921.

were completed 173.97 miles of heavy grading, totaling 3,446,485 cubic yards, and 178 bridges, totaling 71,774 cubic yards of concrete. During the season 5,850 men and 1,350 teams were directly employed in construction work.

A great deal of study was given the traffic problem in the metropolitan areas, especially that adjacent to the City of Chicago. To relieve the congested traffic conditions in this area, the construction of forty-foot pavements was started by both the Division of Highways and the County of Cook. A considerable amount of widening work was also started.

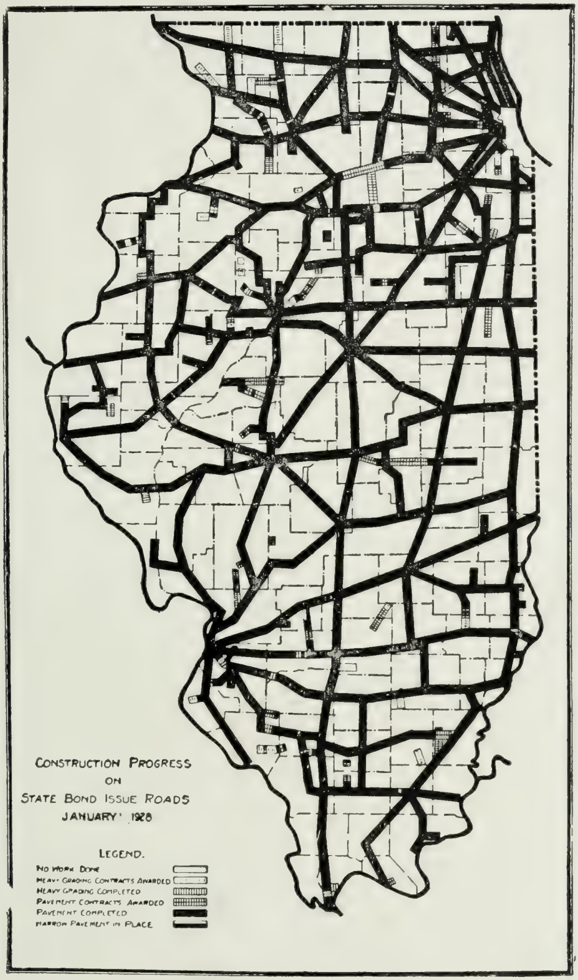


Figure 2.—As Illinois looked January 1, 1928.

Maintenance work is so organized that the highways are kept in a neat and safe condition, and every precaution is taken to safeguard the public investment by thorough and adequate maintenance methods. Particular attention was paid to snow removal, and every effort made to keep the State highways clear. The corps of patrol officers perform efficient work in safeguarding traffic and enforcing the motor vehicle laws. The Federal routes through the State are being marked with the U. S. route numbers designated by the U. S. Bureau of Public Roads and the State highway organizations cooperating with it.

By the end of 1927 the preliminary survey work had been completed on approximately one-half of the roads included in the $100,000,000 Bond Issue System, and plans were underway for carrying on one of the largest road construction programs during 1928 that the State has ever attempted. The prospects for the execution of such a program are better than at any time since the record-breaking program of 1924, for the reason that a large mileage will be under contract by the spring of 1928, thus enabling the contractors to start their work early.

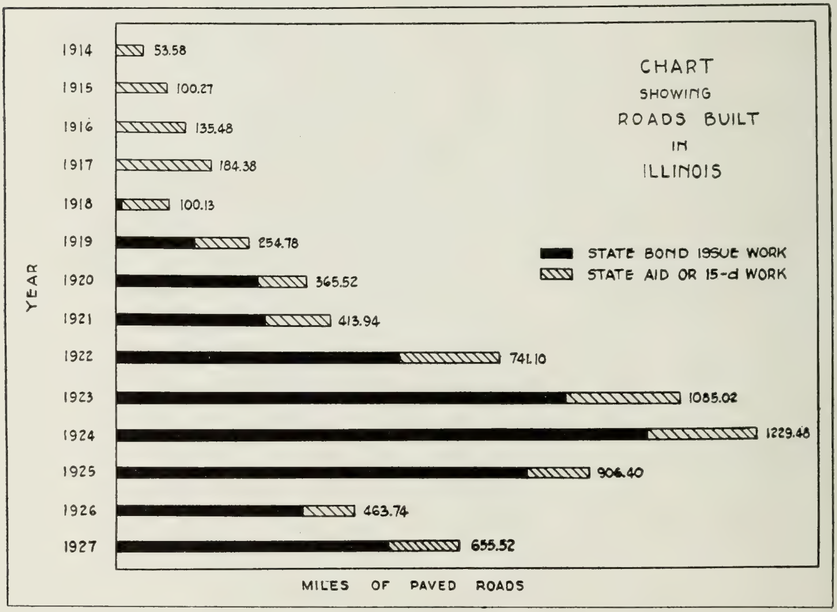


Figure 3.—Chart showing mileage of pavement completed by years from 1914 to 1927, inclusive.

A detailed report of the activities of each Bureau will be found in the following pages. All statistical information is based on calendar years and not on the fiscal year ending July 1st.

II. BUREAU OF DESIGN.

A. ROAD SECTION.

1. GENERAL.—The Bureau of Design supervises the various steps preliminary to actual construction, including the making of reconnaissance surveys and other investigations pertaining to highway location; making the detail surveys, preparation of plans and estimates; preparation of plats and deeds for right of way and supervision of its acquirement; receiving, comparing, and analysing bids; awarding contracts; and directing the execution of contracts and bonds.

This Bureau is also charged with the direction of all matters pertaining to the location of the State Aid roads in the various counties, to refunds to counties and cities, and to grade separations.

The starting of work on the $100,000,000 Bond Issue System greatly increased all of the activities of this Bureau during 1927.

2. RECONNAISSANCE SURVEYS.—The first step in the study of location is the reconnaissance survey. These surveys are made by engineers of the Department, who investigate in the field the relative merits of the various possible locations. Information is secured relative to the comparative cost, length, population served, and safety, economy, and convenience to traffic on each of the probable locations.

Where the reconnaissance survey shows more than one location to be feasible from an engineering standpoint, or where there is difference in opinion in the locality to be served by the road as to the best location, a public hearing is held at which local interests are given an opportunity to present arguments in favor of the location they prefer. The information obtained at this hearing is given consideration in selecting the final location.

A large number of reconnaissance surveys were made and hearings held for routes on the $100,000,000 Bond Issue System during 1927. By the end of the year reconnaissance surveys had been completed for approximately one-half of the roads provided for in that bond issue.

3. SURVEYS AND PLANS.—During 1927 surveys and plans for approximately 1,000 miles of highway were completed. In addition to the plans for the 627 miles of paving and 143 miles of grading awarded during the year, plans were also completed for an additional 219 miles of paving and twenty-five miles of grading on which bids were pending at the end of the year.

4. CONTRACTS AWARDED.—Table I shows the contracts for road work awarded directly by the State from 1914 to 1927, inclusive, on the State bond issue and Federal aid system. Of the contracts awarded during 1927, 3.55 miles of grading and 57.44 miles of pavement were on the $60,000,000 Bond Issue System, and 139.71 miles of grading and 569.74 miles of pavement were on the $100,000,000 Bond Issue System.

TABLE I—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost. per mile.	No.	Total cost.	Miles.	Total cost.	Cost. per mile.
1918	--------	--------------	------------	------	--------------	8.36	$ 201,619.40	$24.131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401.77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47.57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1,488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5,818.01	83	901,884.69	472.05	12,634,976.84	26,766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23,123,159.60	26.617.20
1924	163.93	2,013,223.70	12,280.99	84	1,070,387.21	503.54	13,597,135.32	27,003.09
1925	143.78	1,330,186.60	9.251.54	135	2,607,739.92	899.20	23,818,244.21	26,488.26
1926	41.25	529,489.19	12,863.10	61.5	2,357,421.08	378.00	10,243,739.05	27,099.84
1927	143.26	2,010,988.09	14,037.33	184	2,108,958.81	627.18	18,286,152.06	29,156.15
Total	1,352.19	$14,069,910.62	$10,405.28	1,043.5	$15,027,168.75	4,902.05	$137,116,955.32	$27,971.35

Note.—Grading and bridge work shown does not necessarily coincide with the pavement shown. No Federal Aid or State Bond Issue Contracts were awarded previous to 1918.

Since 1922 all improvements on the State aid system have been made by the counties under the provision of Section 15d of the Road and Bridge Laws. This section of the law permits a county to advance the entire cost of construction and provides that in case of any future State aid appropriation the county may elect to receive its allotment as reimbursement for one-half the cost of the improvement made. When the improvement is concrete, brick or bituminous concrete on concrete base, the State pays the full maintenance cost. If the improvement is gravel or macadam, the maintenance cost is divided equally between the State and county. If the improvement is earth grading, the county bears the entire cost of maintenance.

Table II shows the amount of 15d work placed under contract in the State from 1916 to 1927, inclusive. Table III shows the contracts awarded for 15d work by the various counties during 1927.

TABLE II—15D CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1916	-------	-----------	----------	------	-------------	174.58	$2,204,680.94	$12,628.49
1917	25.93	$ 60,658.01	$ 2,339.30	16	$ 5,065.00	37.34	745,962.28	19,977.56
1918	11.00	45,609.17	4,146.29	21	44,179.64	10.84	270,480.54	24,952.08
1919	42.58	167,425.56	3,932.02	25	40,680.00	153.94	4,391,177.96	28,525.26
1920	13.07	104,533.72	7,997.98	10	185,494.87	44.06	1,626,373.67	36,912.70
1921	17.57	100,154.52	5,700.31	4	61,746.82	63.84	1,484,506.53	23,253.55
1922	15.23	102,085.56	6,702.92	87	359,743.96	258.34	5,637,805.33	21,823.20
1923	15.32	168,804.06	11,018.54	22	620,366.61	187.41	3,433,764.03	18,322.20
1924	21.38	221,007.97	10,337.14	65	329,099.57	174.15	3,528,734.26	20,262.61
1925	52.36	533,349.06	10,186.19	38	358,394.54	122.48	2,966,340.07	24,218.98
1926	56.24	665,000.82	11,824.34	11	155,400.98	106.56	3,140,570.97	29,472.33
1927	85.52	1,172,020.46	13,704.64	17	394,995.26	141.39	4,398,115.94	31,106.27
Total	356.20	$3,340,648.91	$9,378.58	316	$2,555,167.25	1474.93	$33,828,512.52	$22,935.67

TABLE III—CONTRACTS AWARDED FOR COUNTY 15D WORK—1927.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Champaign	--------	--------------	1	$ 2,325.50	--------	$ 3,230.16	$ 5,555.66
Cook	74.038	$1,121,311.46	5	322,705.96	77.049	3,011,156.87	4,455,174.29
Douglas	--------	--------------	------	--------------	0.509	10,280.06	10,280.06
DuPage	--------	--------------	------	--------------	0.847	25,000.00	25,000.00
Iroquois	--------	--------------	------	--------------	16.191	280,024.48	280,024.48
Jersey	--------	--------------	------	--------------	0.152	1,836.64	1,836.64
Kane	4.066	15,000.78	1	8,534.82	4.876	162,297.13	185,841.73
Kankakee	--------	--------------	2	8,873.56	19.237	297,797.46	306,671.02
Lake	1.513	13,751.28	2	13,285.98	11.352	323,052.12	350,089.38
Livingston	--------	--------------	3	6,788.40	--------	--------------	6,788.40
Piatt	--------	--------------	1	2,171.60	--------	--------------	2,171.60
Rock Island	--------	--------------	------	--------------	1.328	35,316.59	35,316.59
Shelby	--------	--------------	------	--------------	0.618	16,516.65	16,516.65
St. Clair	5.899	21,956.94	1	20,306.73	7.501	188,981.16	231,244.83
Tazewell	--------	--------------	------	--------------	0.506	15,342.07	15,342.07
Vermilion	--------	--------------	------	--------------	1.227	27,284.55	27,284.55
Winnebago	--------	--------------	1	9,993.71	--------	--------------	9,993.71
Totals	85.516	$1,172,020.46	17	$394,995.26	141.393	$4,398,115.94	$5,965,131.66

Under the provisions of the $60,000,000 Bond Issue Act, the State was permitted to extend bond issue pavements only through cities and villages having a population of less than 2,500. Because of the fact that there were a number of towns of greater population which could not afford to build pavement to connect with the State highways at the corporate limits, both the Fifty-fourth and Fifty-fifth General Assemblies made appropriations to permit the State to extend otherwise completed $60,000,000 Bond Issue roads through municipalities of more than 2,500 population. During 1927, 2.896 miles of pavement, for which the contract cost plus the estimated value of cement amounted to $73,283.35, were awarded under the provisions of these appropriation acts.

Table IV shows the contracts which have been awarded under the provisions of this legislation.

TABLE IV—CONTRACTS AWARDED UNDER HOUSE BILL, 433.

City.	Route.	Length in miles.	Contract cost + cement.
Abingdon	41	1.286	$52,528.83
Anna	2	1.103	34,573.85
Bushnell	9	0.757	22,704.79
Champaign	39	0.125	4,362.99
Charleston	16	0.226	5,179.92
Clinton	2	0.968	25,554.41
Danville	10	0.058	1,817.24
Flora	25	0.306	8,992.90
Freeport	5	0.368	10,303.48
Galena	5	0.689	31,309.81
Galva	28	1.130	29,024.42
Geneseo	7	0.986	23,861.87
Harrisburg	1	0,404	14,221,25
Highland	11	0.765	20,904.05
Jerseyville	3 and 38	1.523	37,803.13
Lawrenceville	1	1.020	23,001.73
Litchfield	16	0.696	19,752.10
Marseilles	7	1.965	54,895.23
Mattoon	25	0.125	3,396.14
Mendota	2 and 18	1.005	27,798.68
Metropolis	1	1.056	29,008.43
Mt. Carroll	40	0.447	11,522.33
Mt. Olive	16	1.780	47,621,55
Ottawa	7	0.858	23,118.90
Pana	24	0.723	18,979,73
Paxton	9 and 25	1.162	24,665.94
Pontiac	4	0.867	24,035.82
Robinson	1	0.202	10,088.90
Roodhouse	3	1,313	33,356.01
Shelbyville	16	0.467	11,425.83
Staunton	4 and 16	1.598	51,063.56
Sullivan	32	0.031	1,187.10
Sycamore	23	0.099	4,160.69
Vandalia	11	0.936	27,075.60
Virden	4	1.649	45,517.39
West Frankfort	37	0.363	12,922.21
Whitehall	3	1.962	52,989.79
Total		31.018	$880,726.60

5. REFUNDS TO CITIES.—Prior to the enactment of legislation providing for construction in cities of more than 2,500 population, a number of cities had at their own expense constructed pavements to complete $60,000,000 bond issue roads within their corporate limits. The last two General Assemblies made appropriations to refund such cities the cost of these pavements: provided, that the population was less than 7,500; that the residences along the street averaged more than 200 feet apart; that the pavement was built subsequent to January 1, 1921 and subsequent to the time work was started on the State bond issue road adjacent to the corporate limits; that the pavement followed the most feasible route through the city; and, that the pavement be deemed satisfactory by the Department as to type, width, thickness, strength and smoothness.

Claims have been filed by a number of cities for refunds under this legislation. In each case, careful investigations were made to insure that the pavement in question met the conditions of the law. In some instances, conditions were found which failed to meet certain of the legal requirements; in other cases, claims were rejected on account of faulty construction.

Table V lists the various cities to which refunds had been made to December 31, 1927. In addition to these, claims were approved for refunds which can be paid early in 1928, and investigations were under way for additional claims.

TABLE V—REFUNDS TO CITIES.

Route.	City.	Miles.	Amount.
2	Carbondale	0.207	$5,896.08
13	Carbondale	0.292	8,684.69
4	Carlinville	0.169	5,734.70
16	Charleston	0.422	11,536.02
25	Effingham	0.102	2,464.63
11	Greenville	0.791	25,936.36
10	Jacksonville	0.189	4,837.39
37	Johnston City	0.050	1,327.36
28	Kewanee	1.695	15,001.30
4	Normal	0.536	14,000.38
2	Oglesby	0.369	12,116.96
2	Pana	0.751	22,213.74
6	Rochelle	0.880	24,970.41
7	Vandalia	0.753	23,654.05
	Totals	7.206	$178,374.07

6. UNIT PRICES.—The contract unit prices for the principal items in highway construction during 1927 are shown in Figure 4. The dates on which bids were received are shown at the bottom of the chart. The various points on the graphs are plotted from weighted average unit prices for all work on which Federal aid and State bond issue contracts were awarded.

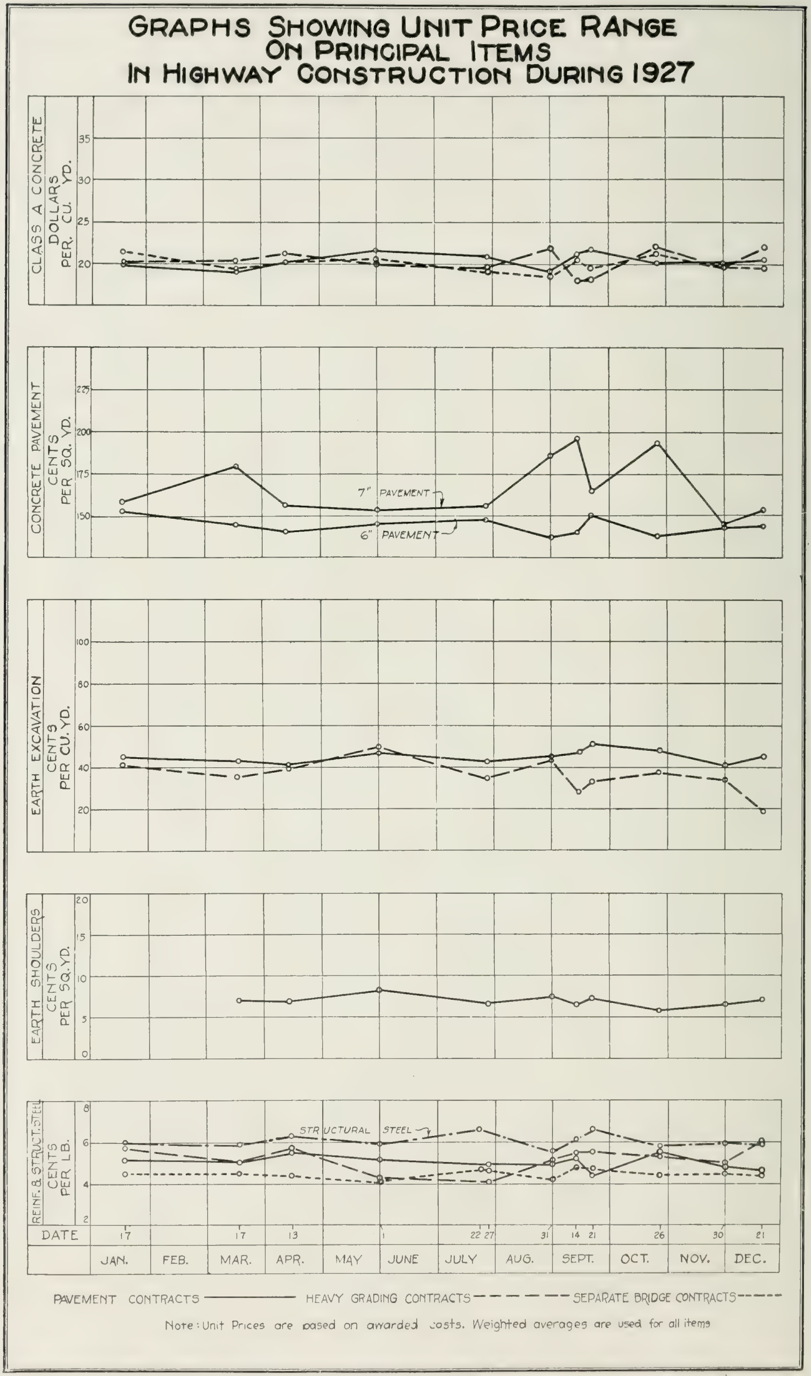
Figure 5 shows the weighted average unit prices by years from 1919 to 1927, inclusive.

7. CHANGES IN DESIGN POLICIES.—The more important changes made in design policies during 1927 are as follows:

(a) The width of graded roadway on all State bond issue routes was increased. On important roads a roadway forty feet wide is provided; on less important roads a thirty-four foot roadway is provided. The width of the shoulders on the forty foot roadway is eleven feet for eighteen foot pavements and ten feet for twenty foot pavements. The thirty-four foot roadway section is used only where the pavement is eighteen feet wide, giving eight foot shoulder width. The minimum right of way width required is in most cases eighty feet.

(b) During 1925 that area around Chicago bounded by State bond issue Route twenty-two was designated as a "metropolitan area" in which all pavement should be at least twenty feet wide with shoulders not less than ten feet, and a clear roadway on bridges and culverts of forty-four feet. During 1927 the boundaries were extended north to the State line, and west to the State bond issue Route 61. That portion of the territory tributary to East St. Louis and bounded by Route 157 was also designated as a "metropolitan area" during 1927.

(c) The policy of water-soaking earth fills to accelerate settlement was adopted during this year. It was found that by following this practice, fills of moderate depth could be paved almost



Note: Unit Prices are based on awarded costs. Weighted averages are used for all items

Figure 4.

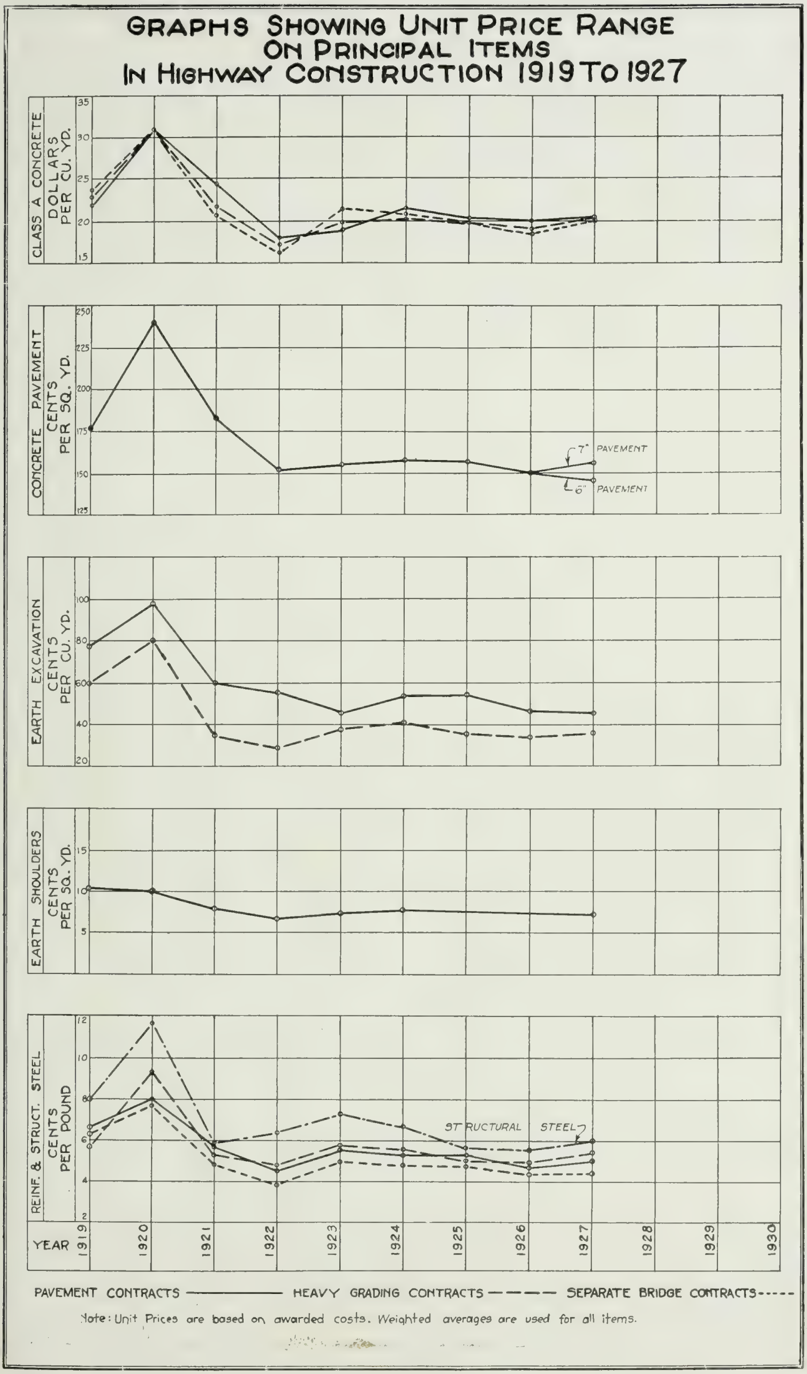

GRAPHS SHOWING UNIT PRICE RANGE ON PRINCIPAL ITEMS IN HIGHWAY CONSTRUCTION 1919 TO 1927
CLASS A CONCRETE
DOLLARS PER CU. YD.
35
30
25
20
15
CONCRETE PAVEMENT
CENTS PER SQ. YD.
250
225
200
175
150
125
7" PAVEMENT
6" PAVEMENT
EARTH EXCAVATION
CENTS PER CU. YD.
100
80
60
40
20
EARTH SHOULDERS
CENTS PER SQ. YD.
15
10
5
REINF. & STRUCT. STEEL
CENTS PER POUND
12
10
8
6
4
2
STRUCTURAL STEEL
YEAR
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
PAVEMENT CONTRACTS
HEAVY GRADING CONTRACTS
SEPARATE BRIDGE CONTRACTS
Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 5.

immediately, thereby eliminating many gaps in the pavement left for the purpose of permitting the settlement of embankments.

(d) The Department returned to the practice of making separate payment for the cost of finishing earth shoulders. Since 1925 it had been the policy to include the cost of finishing the shoulders in the unit prices for excavation.

8. WIDER PAVEMENTS.—The first forty-foot pavement constructed on the State bond issue system was placed under contract in 1926. This was located on a short section on Route 4 near Chicago.

In 1927 the Department either awarded contracts for or had received bids for the construction of forty-two miles of additional forty foot pavement. These contracts were on Route 54 Chicago to Elmhurst, Route 64 Elmhurst to St. Charles, and Route 49 Kankakee to the Cook-Will County line. It is proposed to extend the forty-foot pavement north of Kankakee to Chicago, as soon as the location for that portion in Cook County has been determined. In the future there will probably be additional pavements of this width constructed in the territory adjacent to Chicago.

9. PAVEMENT CROSS-SECTIONS.—The Standard pavement cross-sections in use during 1927 are shown in Figures 6 and 7. The eighteen-foot pavement width was used on the majority of the work placed under contract. The twenty-foot width was used near the large centers of population where heavy truck traffic is anticipated. The bituminous concrete and bituminous filled brick pavements are shown for eighteen-foot widths only, but alternate bids are received on these types for all widths for which Portland Cement concrete cross-sections are shown.

10. FEDERAL AID.—Table VI shows all Federal aid allotments which have been made to Illinois.

TABLE VI—FEDERAL AID ALLOTMENTS.

Fiscal year ending June 30.	Fund.	Amount allotted to Illinois.	Sub-total.
1917	$ 75,000,000.00	$ 220,926.23	
1918		441,852.46	
1919		658,323.48	
1920		874,220.26	
1921		1,091,266.98	$3,286,589.41
1919	200,000,000.00	$2,185,550.65	
1920		3,278,325.98	
1921		3,273,800.93	8,737,677.56
1922	75,000,000.00	$3,246,281.07	3,246,281.07
1923	50,000,000.00	$2,164,187.38	
1923	Reapportionment	28,611.00	
1924	65,000,000.00	2,797,888.59	
1925	75,000,000.00	3,203,867.99	
1926	75,000,000.00	3,191,479.00	
1927	75,000,000.00	3,175,616.00	
1928	75,000,000.00	3,154,429.00	
1929	75,000,000.00	3,135,225.00	20,851,303.96
Total Federal aid allotments to Illinois			$36,121,852.00

The status of Federal funds on January 1, 1928 is shown in Table VII. This table shows the four distinct steps in Federal aid procedure. The first, or project statement stage, is that in which funds are obligated by preliminary statements only, and the amounts are therefore approximate. The next, or project agreement estimate stage, is that in which contract has been awarded, actual unit costs received, but before an agreement has been executed with the Federal Government with respect to the share of the cost which it will assume. The project agreement stage is that in which an agreement has been made with the Federal Government as to its share of the cost and as to construction details. The sum of the amounts shown in these three stages is the approximate Federal aid to be received on uncompleted projects. The last column of the table is that of the completed work stage, which shows the Federal aid already received.

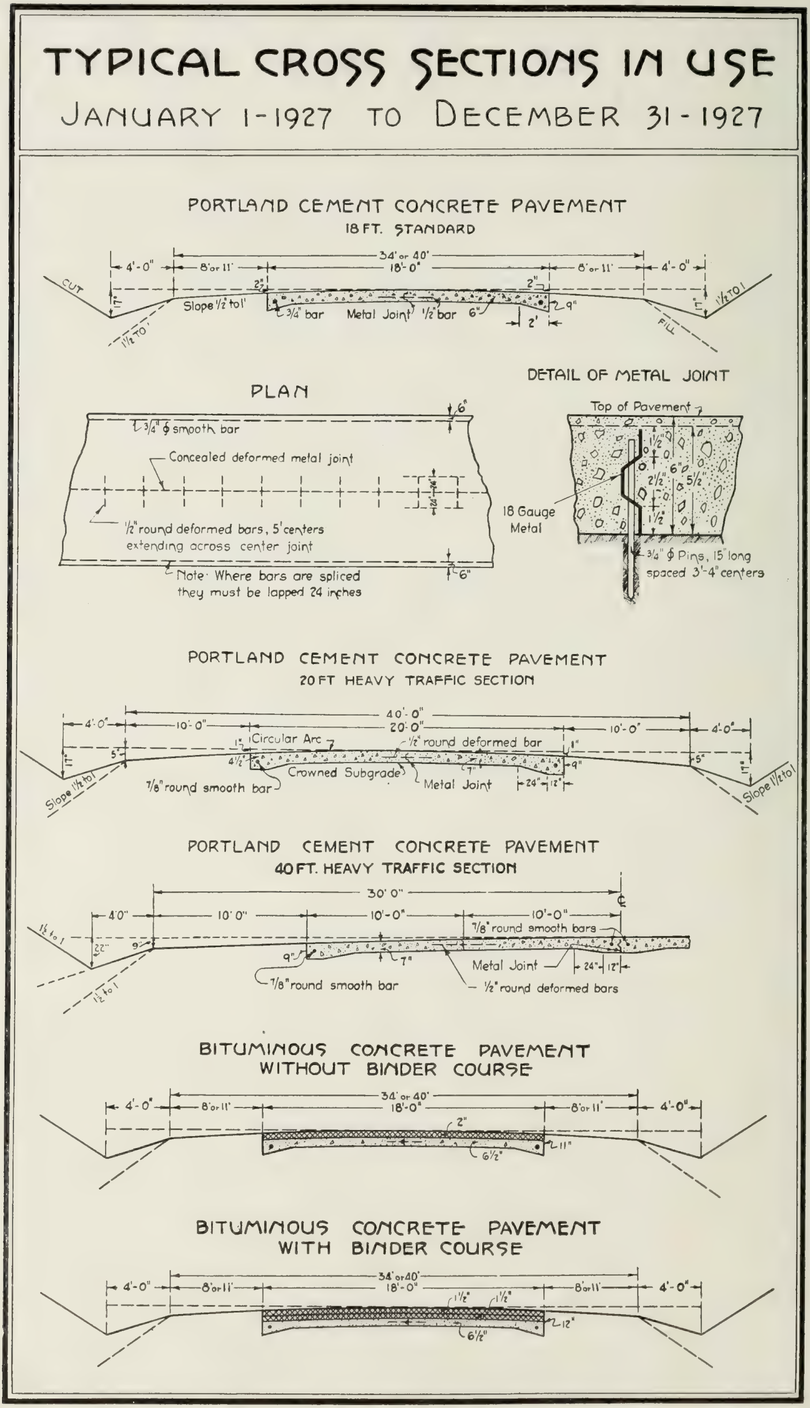

TYPICAL CROSS SECTIONS IN USE
JANUARY 1-1927 TO DECEMBER 31-1927
PORTLAND CEMENT CONCRETE PAVEMENT
18 FT. STANDARD
4'-0"
8' or 11'
34' or 40'
18'-0"
8' or 11'
4'-0"
CUT
1½ TO 1
Slope ½ to 1'
2"
2"
¾" bar
Metal Joint
½" bar
6"
9"
2'
FILL
1½ TO 1
PLAN
¾" ϕ smooth bar
6"
Concealed deformed metal joint
½" round deformed bars, 5' centers extending across center joint
Note: Where bars are spliced they must be lapped 24 inches
6"
DETAIL OF METAL JOINT
Top of Pavement
1½"
6"
2½"
5½"
1½
18 Gauge Metal
¾" ϕ Pins, 15" long spaced 3'-4" centers
PORTLAND CEMENT CONCRETE PAVEMENT
20 FT HEAVY TRAFFIC SECTION
4'-0"
40'-0"
10'-0"
20'-0"
10'-0"
4'-0"
1"
Circular Arc
½" round deformed bar
1"
5"
4½"
Crowned Subgrade
7"
9"
5"
Slope 1½ to 1
⅞" round smooth bar
Metal Joint
24"
12"
Slope 1½ to 1
PORTLAND CEMENT CONCRETE PAVEMENT
40 FT. HEAVY TRAFFIC SECTION
30'0"
4'0"
10'0"
10'-0"
10'-0"
℄
1½ to 1
⅞" round smooth bars
22"
9"
9"
7"
Metal Joint
24"
12"
1½ to 1
⅞" round smooth bar
½" round deformed bars
BITUMINOUS CONCRETE PAVEMENT
WITHOUT BINDER COURSE
4'-0"
8' or 11'
34' or 40'
18'-0"
8' or 11'
4'-0"
2"
11"
6½"
BITUMINOUS CONCRETE PAVEMENT
WITH BINDER COURSE
4'-0"
8' or 11'
34' or 40'
18'-0"
8' or 11'
4'-0"
1½"
1½"
12"
6½"

Figure 6.

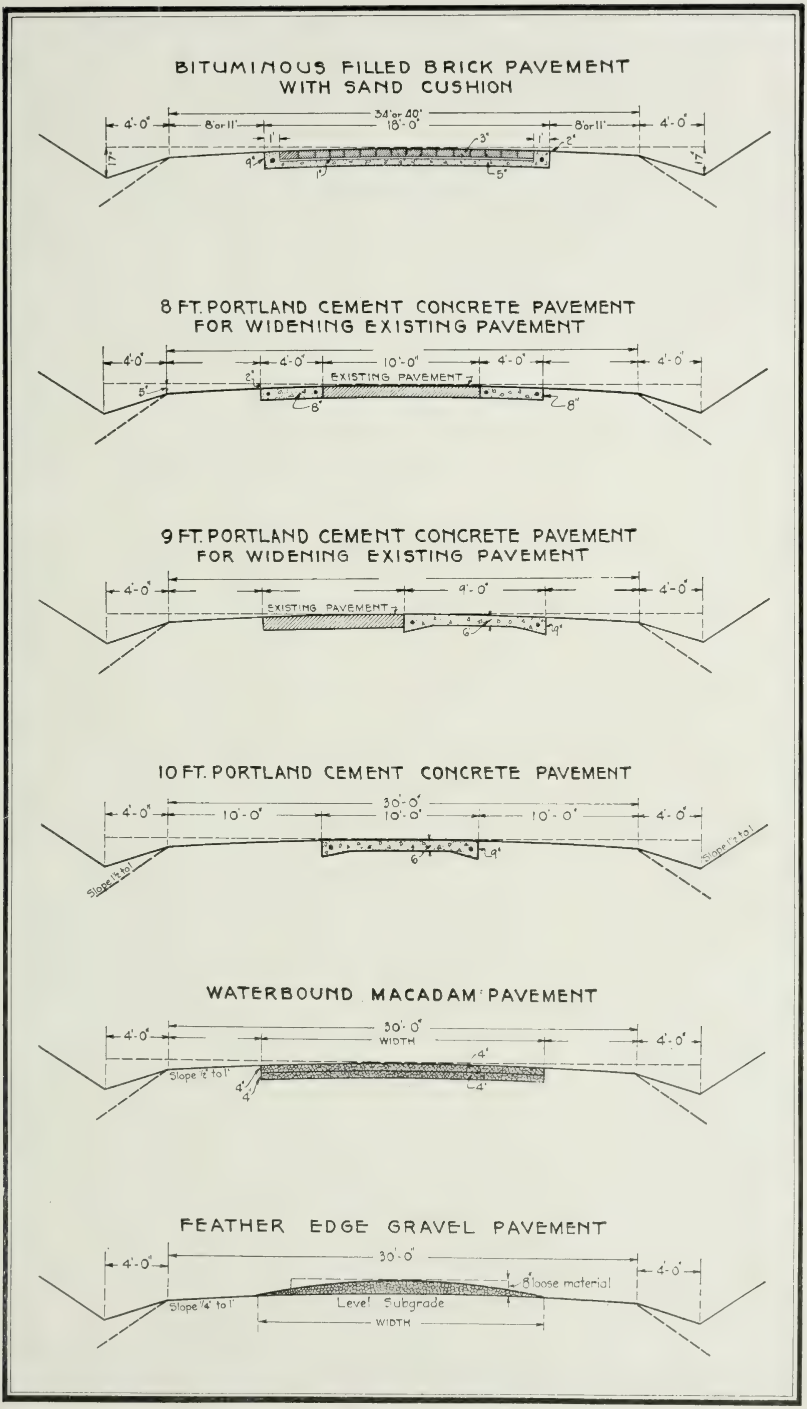

BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION
34' or 40'
4'-0"
8' or 11'
18'-0"
8' or 11'
4'-0"
1'
3"
1'
2"
17"
9"
1"
5"
17"
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
4'-0"
4'-0"
10'-0"
4'-0"
4'-0"
2"
EXISTING PAVEMENT
5"
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
4'-0"
9'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
4'-0"
10'-0"
10'-0"
10'-0"
4'-0"
6"
9"
Slope 1½ to 1
Slope 1½ to 1
WATERBOUND MACADAM PAVEMENT
30'-0"
WIDTH
4'-0"
4'-0"
4"
Slope ½ to 1"
4"
4"
4"
FEATHER EDGE GRAVEL PAVEMENT
30'-0"
4'-0"
4'-0"
8" loose material
Slope ¼ to 1"
Level Subgrade
WIDTH

Figure 7.

TABLE VII—STATUS OF FEDERAL AID JANUARY 1, 1928.

Project No.	S. B. I. route number.	Length miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
1-86		1,385.513					$ 53,902.19	$ 19,942.10	$44,368,715.65	$20,825,757.46	$20,825,757.46
87	3	4.348							141,382.98	65,220.00	65,220.00
88	18	11.113					71,392.78	35,696.39	2,196.00	1,098.00	1,098.00
89	3	11.165					39,094.79	18,009.11	266,183.91	130,610.44	130,610.44
90	3	7.649					8,066.60	4,033.30	210,286.68	105,143.34	105,143.34
91	31	3.303							128,626.37	49,545.00	49,545.00
92	3	14.363							399,249.31	199,624.65	199,625.65
93	3	19.504							557,527.32	276,473.55	276,473.55
94	22	5,076							154,946.34	77,473.17	77,473.17
95	23	19.735							525,628.44	262,814.21	262,814.21
96	13	23.805					1,493.33	746.66	669,498.27	327,300.03	327,300.03
97	9	30.212							844,569.98	422,284.98	422,284.98
98	16	12.859							340,999.36	170,499.67	170,499.67
99	9	19.082					72,296.73	34,627.71	473,304.51	231,147.24	231,147.24
100		No project									
102	24	12.833					151,630.33	75,155.47	248,657.03	124,328.51	124,328.51
103	1	18.804					128,059.11	64,029.55	350,634.51	175,317.25	175,317.25
104	34	38.570					138,036.63	66,272.26	1,096,924.67	510,437.42	510,437.42
105	8	18.381					210,938.49	89,152.49	339,243.79	150,975.99	150,975.99
106	39	21.222					80,598.57	40,299.28	341,267.39	170,633.69	170,633.69
107	30	17.979					74,611.20	37,305.62	434,722.47	217,361.22	217,361.22
108	36	18.030					44,703.97	22,351.98	390,565.84	195,282.92	195,282.92
109	40	39.133					122,919.82	60,119.53	994,595.04	491,044.36	491,044.36
110	13	8.830	$154,309.35	$ 77,154.67			22,046.92	10,883.68	158,877.71	75,314.64	75,314.64
111	36	11.538							292,516.15	146,258.07	146,258.07
112	31	23.102					78,577.29	39,614.63	596,208.14	284,386.38	284,386.38
113	11	7.477					30,148.60	15,074.30	146,050.58	73,025.29	73,025.29
114	38	8.907					117,250.59	41,581.96	198,042.43	97,021.21	99,021.21
115	13	13.637					206,129.26	103,132.96	299,294.26	130,398.83	130,398.83
116	78	10.5	204,345.10	102,172.55			25,131.25	12,565.63	107,073.65	53,536.82	53,536.82
117	59	4.497					42,263.66	20,070.43	105,299.14	47,384.57	47,384.57
118	154	7.896					329,218.49	153,185.49			
119		No project									
120	91	11.5	78,508.48	39,254.24			52,415.24	23,675.93	134,383.70	56,531.62	56,531.62
121	86	12.6	388,600.00	194,300.00							
122	78	16.5	523,681.21	261,840.61			102,442.18	56,542.29	57,717.00	28,857.49	28,857.49
123	172	5.21	164,480.00	82,240.00							
124	122	8.562	887,544.11	443,772.05							
125	140	2.051					9,161.36	4,580.68	51,294.53	25,647.26	25,647.26

126	88	12.899					60,902.33	30,603.18	131,953.77	64,657.35	64,657.35
127	151	8.281	73,699.74	36,849.87			113,735.29	56,867.65	5,715.27	2,857.63	2,857.63
128	96	7.461	77,190.81	39,094.54			141,539.32	70,559.54	82,269.87	40,845.92	40,845.92
129	80	14.4	492,500.00	246,250.00							
130	74	15.0	468,087.98	234,043.99			93,689.05	46,844.53	161,222.97	80,611.48	80,611.48
131	121	6.851	135,443.46	67,721.73							
132	63	8.5	268,235.38	134,117.69	$106,764.62	$53,382.31					
133	125	8.342	69,622.68	33,136.40			171,418.45	85,709.22			
134	99	5.560					83,398.19	41,699.09	84,928.16	42,464.08	42,464.08
135	121	73.0	1,291,908.08	648,791.65			15,324.89	8,244.44	120,886.60	58,025.56	58,025.56
136	89	28.5	619,182.91	309,591.46	58,676.99	29,338.44	14,830.06	7,415.03	224,210.04	112,105.02	112,105.02
137	98	27.0	531,989.39	276,929.13	39,537.24	8,834.19	324,693.67	162,346.83	12,279.70	6,139.85	6,139.85
138	150	7.1	643,000.00	321,500.00							
139	49	33.5	1,072,000.00	536,000.00							
140	51	23.893	673,124.37	368,227.30	95,579.80	47,789.80					
141	50	11.8	625,000.00	312,000.00							
142	70	44.0	573,158.06	286,579.04			237,198.58	118,599.28	438,643.36	219,321.68	219,321.68
143	83	55.5	1,358,259.87	679,129.94			403,740.13	201,870.06			
144	85	1.732					75,107.47	31,783.41			
145	95	10.123					308,277.92	154,138.96			
146		No project									
147	157	19.0	558,873.90	287,960.18			86,886.56	34,146.40	20,239.54	7,893.42	7,893.42
148	152	19.5	463,560.00	231,780.00							
149	162	12.249	231,780.00				322,305.47	161,152.73			
150	88	33.0	1,000,500.00	500,250.00							
151	58	28.5	943,000.00	471,500.00							
152	160	40.5	1,372,000.00	686,000.00							
153	122	42.0	1,890,000.00	945,000.00							
154	147	10.0	532,000.00	266,000.00							
155	80	14.5	461,300.00	230,650.00							
156	164	27.0	1,043,000.00	521,500.00							
	Total.	2,555.177	$19,638,004.88	$9,729,910.25	$300,558.65	$139,344.74	$4,665,576.76	$2,260,629.78	$56,703,832.43	$26,835,657.28	$26,835,657.28

11. STATE AID.—The State aid system is composed of the secondary roads of the State. The Road and Bridge Laws provide that State aid roads which have not been improved by the counties and taken over by the Department of Public Works and Buildings shall be under the jurisdiction of the various counties, who are responsible for their upkeep.

Table VIII shows the mileage of State aid roads in the various counties as of January 1, 1928.

TABLE VIII—STATUS OF STATE AID MILEAGE.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Adams	2	1,538.00	384.50	382.00	2.50
Alexander	1	427.00	85.40	60.55	24.85
Bond	1	655.00	131.00	118.14	12.86
Boone	1	492.00	98.40	91.40	7.00
Brown	1	513.00	102.60	96.80	5.80
Bureau	2	1,481.00	370.25	343.35	26.90
Calhoun	1	317.80	63.56	58.80	4.76
Carroll	1	748.00	149.60	123.85	25.75
Cass	1	570.00	114.00	115.50	----------------
Champaign	2	1,910.00	477.50	381.13	96.37
Christian	2	1,269.00	317.25	260.30	56.95
Clark	1	994.00	198.80	199.45	----------------
Clay	1	842.00	168.40	152.80	15.60
Clinton	1	704.00	140.80	100.10	40.70
Coles	2	968.00	242.00	187.65	54.35
Cook	3	1,614.00	807.00	503.82	303.18
Crawford	1	821.00	164.20	122.20	42.00
Cumberland	1	687.00	137.40	95.25	42.15
DeKalb	2	1,089.00	272.25	242.23	30.02
DeWitt	1	732.00	146.40	113.50	32.90
Douglas	1	790.00	158.00	101.60	56.40
DuPage	2	776.00	194.00	188.85	5.15
Edgar	2	1,105.00	276.25	266.53	9.72
Edwards	1	414.00	82.80	67.60	15.20
Effingham	1	956.00	191.20	146.30	44.90
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	130.60	39.00
Franklin	1	648.00	129.60	129.20	0.40
Fulton	2	1,488.00	372.00	346.25	25.75
Gallatin	1	440.00	88.00	74.00	14.00
Greene	1	805.00	161.00	159.35	1.65
Grundy	1	756.75	151.35	149.10	2.25
Hamilton	1	817.00	163.40	142.80	20.60
Hancock	2	1,452.00	363.00	239.80	123.20
Hardin	1	245.00	49.00	40.55	8.45
Henderson	1	595.00	119.00	101.40	17.60
Henry	2	1,401.00	350.25	285.80	64.45
Iroquois	2	2,108.00	527.00	420.60	106.40
Jackson	2	977.00	244.25	199.00	45.25
Jasper	1	960.00	192.00	173.70	18.30
Jefferson	2	1,100.00	275.00	230.20	44.80
Jersey	1	572.00	114.40	98.20	16.20
JoDaviess	2	883.00	220.75	163.90	56.85
Johnson	1	432.00	86.40	75.25	11.15
Kane	2	836.00	209.00	208.95	0.05
Kankakee	2	1,300.00	325.00	242.62	82.38
Kendall	1	508.00	101.60	98.10	3.50
Knox	2	1,308.85	327.21	327.72	----------------
Lake	2	850.70	212.68	187.09	25.59
LaSalle	2	2,006.00	501.50	382.03	119.47
Lawrence	1	662.00	132.40	128.85	3.55
Lee	2	1,229.00	307.25	307.88	----------------
Livingston	2	2,029.00	507.25	363.25	144.00
Logan	2	957.00	239.25	192.35	46.90
McDonough	2	1,094.00	273.50	275.60	----------------
McHenry	2	993.00	248.25	239.75	8.75
McLean	2	2,080.00	520.00	311.05	208.95
Macon	2	1,027.00	256.75	224.45	32.30
Macoupin	2	1,427.00	356.75	295.17	61.58

TABLE VIII—Concluded.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Madison	2	1,169.00	292.25	227.85	64.40
Marion	2	1,138.00	284.50	238.30	46.20
Marshall	1	618.00	123.60	121.02	2.58
Mason	1	798.00	159.60	130.95	28.65
Massac	1	368.00	73.60	59.25	14.35
Menard	1	506.00	101.20	97.45	3.75
Mercer	1	911.00	182.20	143.50	38.70
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1,258.00	314.50	252.10	62.40
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	97.20	26.40
Ogle	2	1,330.00	332.50	332.20	0.30
Peoria	2	1,099.75	274.93	268.10	6.83
Perry	1	706.00	141.20	122.35	18.85
Piatt	1	764.00	152.80	145.40	7.40
Pike	2	1,542.00	385.50	285.75	99.75
Pope	1	559.30	111.86	106.05	5.81
Pulaski	1	334.50	66.90	56.35	10.55
Putnam	1	270.00	54.00	45.45	8.55
Randolph	2	886.00	221.50	166.50	55.00
Richland	1	809.00	161.80	147.70	14.10
Rock Island	2	688.00	172.00	161.80	10.20
St. Clair	2	1,279.00	319.75	203.65	116.10
Saline	1	609.00	121.80	82.50	39.30
Sangamon	2	1,401.00	350.25	237.95	112.30
Schuyler	1	840.00	168.00	163.45	4.55
Scott	1	363.00	72.60	73.30	
Shelby	2	1,495.00	373.75	290.10	83.65
Stark	1	531.00	106.20	112.05	
Stephenson	2	1,077.00	269.25	226.30	42.95
Tazewell	2	1,010.00	252.50	213.50	39.00
Union	1	626.00	125.20	120.80	4.40
Vermilion	2	1,558.00	389.50	329.30	60.20
Wabash	1	380.00	76.00	70.50	5.50
Warren	1	990.00	198.00	135.70	62.30
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	233.95	42.25
White	2	992.00	248.00	181.56	66.44
Whiteside	2	1,130.00	282.50	265.00	17.50
Will	2	1,611.00	402.75	355.25	47.50
Williamson	2	827.00	206.75	152.90	53.85
Winnebago	2	1,025.53	256.38	252.05	4.33
Woodford	1	941.00	188.20	165.35	22.85
Total		97,287.18	23,011.27	19,194.79	3,828.67

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

Class.	Number of counties.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
1	52	34,280.35	6,856.07	5,928.01	936.76
2	49	61,392.83	15,348.20	12,762.96	2,588.73
3	1	1,614.00	807.00	503.82	303.18
Total	102	97,287.18	23,011.27	19,194.79	3,828.67

12. GRADE SEPARATIONS.—It has been the policy to eliminate dangerous grade crossings on the bond issue system wherever possible, and the Department has continued its efforts along this line during the past year. Locations for highways are selected which will avoid railroad crossings insofar as possible. Where it is necessary to cross a railroad, an effort is made to separate grades between the

TABLE IX—GRADE SEPARATION CASES SETTLED.

Location.				Railroad.	I. C. C. case number.	Type of crossing.	Petition filed.	Final hearing.	I. C. C. order issued.	Year completed.
Route.	Section.	County.	Near.							
1	11	Will	Steger	C. & E. I.	9264	Under	July 9, 1919	May 10, 1922	May 25, 1922	1923
1	F-1	Clark	Marshall	Penn	10702	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
1	F	Clark	Marshall	C. C. C. & St. L	11076	Under	Oct. 28, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
1	161	Cook	Harvey	I. C		Under				1925
1	161	Cook	Homewood	I. C.	13375	Over	June 25, 1923	July 19, 1923	Oct. 17, 1923	1924
1	35	Johnson	Ozark	I. C.	12858	Under	Dec. 11, 1922	Apr. 9, 1925	May 20, 1925	1925
1	38-V	Johnson	Vienna	C., C., C. & St. L	14353	Over	Aug. 7, 1924	Sept. 10, 1925	Oct. 20, 1925	1926
1	37-V	Johnson	Bloomfield	C., C., C. & St. L	12859	Over	Dec. 11, 1922	Feb. 5, 1925	May 13, 1925	1925
1	K-V	Cook	Riverdale	I. H. B	15962	Over	Jan. 5, 1926	Feb. 9, 1926	Feb. 24, 1926	1927
1	33	Saline	Stonefort	S. I. & K	14506	Under	Oct. 11, 1924	Oct. 23, 1924	Jan. 15, 1925	1926
2	14	Pulaski	Ullin	C. & E. I	12634	Under	Sept. 5, 1922	May 1, 1923	June 21, 1923	1923
2	3	Jackson	DeSoto	M. P	12636	Under	Sept. 5, 1922	Feb. 6, 1923	Apr. 18, 1923	1923
2	48	Macon	Decatur	I. C	13380	Under	June 26, 1923	May 22, 1924	June 4, 1924	1924
2	3	Jackson	Wards Mine	I. C	10742	Over	June 26, 1920	May 20, 1925	June 3, 1925	1926
2	11-B	Union	Cobden	I. C.	10741	Over	June 26, 1920	Mar. 4, 1926	Mar. 10, 1926	1927
2	51-S	Macon	Maroa	Penn	13676	Under	Nov. 15, 1923	July 20, 1926	July 29, 1926	1927
2	70-V	LaSalle	Oglesby	I. C	15749	Over	Oct. 24, 1925	Dec. 18, 1925	Mar. 17, 1926	1926
2	73-V	Lee	Henkel	I. C.	16011	Over	Jan. 20, 1926	Mar. 24, 1926	Apr. 28, 1926	1927
2	38-V	Ogle	Oregon	C. B. & Q	14711	Over	Jan. 5, 1925	Nov. 2, 1927	Nov. 16, 1927	*
2	67-S	Marshall-LaSalle	Wenona	A. T. & S. F	16472	Under	June 29, 1926	May 4, 1927	May 25, 1927	1927
3	67	Monroe	Columbia	M. & O	12637	Under	Sept. 5, 1922	Mar. 22, 1923	May 8, 1923	1923
3	59	Jersey	McCluskey	C. P. & St. L	13847	Under	Jan. 30, 1924	May 8, 1924	May 14, 1924	1924
3	7	Rock Island	Silvis	D. R. I. & N. W	14412	Under	Sept. 6, 1924	Mar. 5, 1925	Apr. 23, 1925	1925
3	73-S	Randolph	Evansville	M.-I	14665	Under	Dec. 19, 1924	Mar. 4, 1925	May 13, 1925	1926
3	28	Warren-Mercer	Alexis Jc	R. I. S	15436	Under	July 28, 1925	Nov. 3, 1925	Nov. 24, 1925	1925
3	33-S	Warren	Monmouth	C. B. & Q	15926	Under	Dec. 18, 1925	Mar. 4, 1926	Mar. 23, 1926	1926
3	84	Scott	Manchester	C. & A	16364	Under	May 24, 1926	June 22, 1927	July 27, 1927	*
3	37-B-15-D	St. Clair	E. St. Louis	I. C		Under				1926
3	37-15-D	St. Clair	E. St. Louis	I. C		Under				1926
4	M	Will	Joliet	E. J. & E	13923	Under	Feb. 26, 1924	Apr. 16, 1924	May 14, 1924	1924
4	F-1	Madison	Center Grove Park	I. T. Inc	15054	Over	Apr. 17, 1925	July 24, 1925	Nov. 3, 1925	*
4	J-1	Macoupin	Staunton	C. & N. W	16990	Over	Jan. 8, 1927	Feb. 2, 1927	Feb. 16, 1927	*
5	7	Cook	Spaulding	E. J. & E	12635	Over	Sept. 5, 1922	Oct. 25, 1922	Dec. 6, 1922	1925
5	25	JoDaviess	Wood Bine	C. G. W	14359	Over	Aug. 11, 1924	Jan. 6, 1926	Feb. 3, 1926	1926
5	3	Cook	Elmhurst	C. & N. W	15975	Under	Jan. 8, 1926	June 14, 1926	June 23, 1926	1927
6	2	DuPage	W. Chicago	E. J. & E	10887	Under	Aug. 13, 1920	Apr. 16, 1924	May 14, 1924	1924
7	9	Bureau	Langley	C. & N. W	11705	Under	June 6, 1921	July 27, 1921	July 28, 1921	1923
7	R	Bureau	DePue	N. Y. C	13666	Under	Nov. 13, 1923	July 31, 1924	Sept. 10, 1924	1925
7	S	Bureau	Spring Valley	C. & N. W	14959	Over	Mar. 16, 1925	July 17, 1925	July 29, 1925	1925
8	8	Henderson	E. Burlington	C. B. & Q	14492	Under	Oct. 7, 1924	Nov. 2, 1925	Nov. 24, 1925	1926
8	40-V	Knox	Galesburg	C. B. & Q	15214	Over	June 1, 1925	July 12, 1926	July 29, 1926	1926
8	46-S	Knox	Yates City	C. B. & Q	16450	Under	June 22, 1926	July 8, 1926	July 29, 1926	1927
10	24	Morgan	Arnold	Wabash	11857	Under	Aug. 27, 1921	Nov. 23, 1922	Dec. 15, 1922	1923

10	21	Sangamon	Curran	C. & N. W	12460	Under	June 6, 1922	Oct. 18, 1922	Dec. 6, 1922	1923
10	19-X	Sangamon	Riverton	I. T., Inc	13511	Under	Sept. 8, 1923	Oct. 4, 1923	Oct. 24, 1923	1925
11	29-S	St. Clair	E. St. Louis	B. & O., Penn	10291	Under	Mar. 1, 1920	June 29, 1921	Mar. 28, 1922	1925
11	39	Madison	St. Jacob	Penn	10705	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
11	Y	Fayette	Mulberry Grove	Penn	10704	Over	June 15, 1920	Nov. 3, 1921	Nov. 9, 1921	1922
11	L	Effingham	Effingham	Penn	10703	Over	June 15, 1920	Nov. 3, 1921	Dec. 6, 1921	1923
11	42-S	Madison	Highland	Penn	16039	Under	Feb. 1, 1926	Feb. 19, 1926	Mar. 2, 1926	1927
11	45	Clark	Martinsville	Penn	17527	Under	July 21, 1927	July 21, 1927	July 27, 1927	*
12	17-V	Marion	Odin	I. C	12663	Over	Sept. 16, 1922	Sept. 8, 1925	Sept. 17, 1925	1926
12	31-V	St. Clair	O'Fallon	B. & O	16331	Over	May 11, 1926	July 6, 1926	July 21, 1926	1927
12	13	Clay	Greendale	S. I. & K	13635	Over	Oct. 30, 1923	Nov. 13, 1923	Nov. 15, 1923	1926
12	1	Lawrence	Lawrenceville	B. & O	15472	Over	Aug. 12, 1925	Feb. 16, 1927	Mar. 16, 1927	*
12	33	St. Clair	French Village	E. St. L. & Sub	17350	Under	May 21, 1927	Nov. 1, 1927	Nov. 2, 1927	1927
13	13-S	Jackson	Murphysboro	M. P	15440	Under	July 28, 1925	Apr. 21, 1926	June 9, 1926	1926
13	7	Williamson	Crab Orchard	S. I. & K	14505	Under	Oct. 11, 1924	Oct. 23, 1924	Jan. 15, 1925	1926
13	28	St. Clair	Belleville	St. L. & O. R	16928	Over	Dec. 15, 1926	Feb. 3, 1927	Mar. 2, 1927	*
13	24-S	St. Clair	New Athens	I. C	17195	Under	Apr. 6, 1927	June 7, 1927	June 29, 1927	*
13	25-S	St. Clair	Lementon	I. C	17196	Under	Apr. 6, 1927	June 7, 1927	July 6, 1927	*
14	9	Hamilton	McLeansboro	L. & N	12895	Under	Dec. 28, 1922	Oct. 23, 1923	Nov. 7, 1923	1925
14	4	Franklin	Christopher	C. B. & Q	12857	Under	Dec. 11, 1922	May 7, 1924	July 9, 1924	1924
14	7	Franklin	Macedonia	S. I. & K	13585	Under	Oct. 9, 1923	Oct. 23, 1923	Oct. 23, 1923	1925
15	16	Jefferson	Bluford	S. I. & K	13638	Over	Oct. 30, 1923	Nov. 13, 1923	Nov. 15, 1923	1925
17	28-V	Livingston	Blackstone	N. Y. C	16293	Over	Apr. 26, 1926	Oct. 7, 1926	Oct. 27, 1926	1927
18	12-V	Kendall	Montgomery	C. B. & Q	15350	Over	July 13, 1925	Oct. 12, 1925	Oct. 21, 1925	1926
19	86	Cook	DesPlaines	C. & N. W. Soo	12421	Under	July 11, 1922	Nov. 28, 1922	Apr. 25, 1923	*
22	42-A	Cook	Matteson	I. C	12060	Under	Dec. 6, 1921	Jan. 24, 1922	Jan. 25, 1922	1924
22	13-D	Will	Joliet	E. J. & E	14909	Over	Mar. 2, 1925	Mar. 13, 1925	Mar. 18, 1925	1925
22	13-S	Will	Joliet	C. R. I. & P	15246	Under	June 13, 1925	Mar. 3, 1926	Apr. 21, 1926	1926
23	26-V	DeKalb	Genoa	I. C	15130	Over	May 22, 1925	July 17, 1925	July 29, 1925	1926
24	J	Tazewell	Green Valley	C. & N. W	12461	Under	June 6, 1922	Sept. 16, 1925	Nov. 10, 1925	*
25	22-V	Douglas	Tuscola	C. I. & W., C. & E. I., I. C	13845	Over	Jan. 30, 1924	May 6, 1924	May 20, 1925	*
25	7	Clay	Flora	B. & O	13867	Over	Feb. 6, 1924	June 8, 1927	July 27, 1927	*
26	1	Stephenson	S. Freeport	C. G. W	13590	Under	Oct. 8, 1923	Oct. 18, 1923	Nov. 21, 1923	1923
26	4-V	Ogle	Polo	C. B. & Q	14664	Over	Dec. 19, 1924	June 10, 1926	June 24, 1926	1927
27	4-S	Carroll	Lanark	C. M. & St. P	15815	Under	Nov. 7, 1925	May 24, 1927	June 8, 1927	*
28	6	Knox	Wataga	C. B. & Q	13297	Under	May 31, 1923	May 7, 1924	July 9, 1924	1924
28	11	Henry	Kewanee	C. B. & Q	13237	Under	May 11, 1923	May 7, 1924	July 9, 1924	1924
29	M-2	Peoria	Chillicothe	A. T. & S. F	9477	Under	Sept. 10, 1919		Apr. 28, 1920	1921
30	7	Peoria	Princeville	A. T. & S. F	16308	Under	May 1, 1926	Jan. 5, 1927	Feb. 2, 1927	1927
31	3	Adams	Paloma	C. B. & Q	12459	Under	June 6, 1922	Mar. 6, 1923	Apr. 11, 1923	1924
31	16-V	Fulton	Astoria	C. B. & Q	16333	Over	May 12, 1926	July 8, 1926	Sept. 15, 1926	1926
32	4	Moultrie	Lovington	Penn	15212	Under	June 1, 1925	Dec. 3, 1925	Dec. 15, 1925	1926
36	19-S	Pike	Barry	Wabash	15104	Under	May 2, 1925	July 20, 1926	July 29, 1926	1926
37	11	Franklin	W. Frankfort	I. C	14086	Under	May 6, 1924	May 21, 1924	June 4, 1924	1926
37	13	Williamson	Johnson City	I. C	12639	Over	Sept. 6, 1922	Oct. 4, 1923	Dec. 11, 1923	1924
39	12	Piatt	Mansfield	Wabash	15173	Over	May 25, 1925	May 25, 1926	Mar. 24, 1927	*
41	14	Knox	Galesburg	R. I. S	15706	Under	Oct. 14, 1925	Nov. 4, 1925	Dec. 1, 1925	1926
44	15	Kankakee	Bradley	I. C., N. Y. C	13591	Under	Oct. 8, 1923	June 6, 1924	Sept. 10, 1924	1926
46	464	Cook	Hillside	I. C	16927	Under	Dec. 15, 1926	May 4, 1927	May 25, 1927	1927
89	101-V	Lee	Dixon	C. & N. W	17552	Over	Aug. 1, 1927	Oct. 4, 1927	Oct. 26, 1927	*

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* Work not completed.

highway and railway. In such cases it is necessary that an order be obtained from the Illinois Commerce Commission, which has jurisdiction over all railroad crossings in the State, for the separation. It is the practice of the Department to attempt to reach an agreement with the railroad company involved, with respect to the construction details of the proposed separation and the division of cost between the company and the Department, before presenting the matter to the Commission.

There has been completed on the State bond issue systems, 77 grade separations, exclusive of those which existed when the highways were built and which have been utilized in place. Of this number, 14 were completed in 1927. Orders have also been secured from the Commerce Commission for 16 additional separations, the construction of which had not been completed at the end of the year. Table IX shows the grade separation cases settled since work was started on the $60,000,000 Bond Issue System. In addition to these, negotiations are under way for a number of others for which settlements will probably be reached in 1928.

B. BRIDGE SECTION.

1. GENERAL.—The Bridge Section of the Bureau of Design is charged with the preparation of the plans, specifications and estimates of cost of all drainage structures on the State road system. Since the inauguration of the intensive construction program financed by State bond issues, the handling of work incident to it has constituted the major activity of the Bridge Section. At the same time, all requests for engineering assistance on county and township work have been taken care of. There has not been the increase in this class of work, however, which might be expected, due to some extent, no doubt, to the fact that an increasing number of county superintendents of highways are preparing plans for their drainage structures in their own office. It is possible also that the more recently appointed county superintendents are unaware of the services offered by this Bureau. It is the duty of the Division of Highways, under the law, to perform the necessary engineering work required for the construction of bridges upon county and township highways, including the making of surveys, the preparation of plans and specifications, and general supervision of the construction, and these services are available to those county superintendents of highways who desire to take advantage of them.

A summary of the activities of the Bridge Section during 1927 follows:

TABLE X—PLANS PREPARED AND CONTRACTS AWARDED.

Year.	Plans prepared.	Estimated cost.	Contracts let.	Contract price.	Foreign plans approved.
1906	15		11	$ 37,035.00	Prepared by County Superintendent of Highways and others outside of Division of Highways.
1907	113		48	41,519.00	
1908	149		64	165,674.00	
1909	122		92	133,285.00	
1910	203		141	148,432.00	
1911	241		127	238,903.00	
1912	214		150	212,694.00	
1913	238	$ 342,052.00	139	200,834.00	5
1914	269	470,363.00	109	184,792.00	269
1915	707	984,420.00	565	541,509.00	230
1916	735	1,169,743.00	439	566,657.00	653
1917	480	812,614.00	502	582,993.00	503
1918	206	499,702.00	169	277,130.00	443
1919	231	761,458.68	202	514,897.00	725
1920	443	2,841,896.22	301	2,208,494.84	261
1921	384	2,134,476.49	337	1,909,455.67	362
1922	374	2,365,726.45	317	1,775,066.00	839
1923	484	3,359,109.03	413	3,170,269.46	1,451
1924	420	4,220,819.17	258	1,594,035.90	886
1925	340	2,972,560.80	283	2,940,774.86	1,215
1926	281	3,782,267.84	164	2,702,055.34	1,145
1927	402	3,991,491.67	310	2,137,389.93	1,516
Total	7.051	$30.708,700.35	5.141	$22,283,896.00	10,503

2. PLANS PREPARED.—The number of plans prepared in 1927 for structures designed to be built as separate bridge contracts are shown in Table X. In addition to these, a large number of smaller structures, such as culverts and small bridges, were designed to be built in connection with paving and grading contracts. Adding this work to that given in Table X, increases the total volume of work for 1927 to 8,450 plans prepared, with estimated cost of $6.263,645.24. Table X also shows the total number of plans prepared for major structures constructed independently of pavement work each year from 1906 to 1927, inclusive.

The largest single project for which plans were prepared in 1927 was the Illinois River bridge at Pekin. The general elevation and plan for this structure are shown in Figure 8. The channel span is to be a vertical lift which will provide a horizontal clearance of 220 feet between fender piers and a vertical clearance, when open, of sixty-five feet above the maximum high water line. The overall length of the bridge between abutments will be 1,324 feet. The roadway will be twenty-four feet wide and a five-foot sidewalk will be provided for pedestrians. The plan also provides for a grade separation over the tracks of the C. C. C. & St. L. and P. & P. U. railroads at the east end of the bridge. This bridge is to be built on a new location in line with Margaret Street which will allow the old bridge to remain in service until the new one is completed.

3. CONTRACTS AWARDED.—A summary of the contracts awarded together with the contract price is given by years in Table X. The contracts awarded in 1927 are classified in paragraph 5 of this section.

4. OVERHEAD GRADE SEPARATIONS.—The elimination of grade crossings is an important branch of the work of the Division of

Highways. Comparative costs of construction and the availability of natural drainage generally determine whether the highway shall be carried over or under the intersecting railroad. In the majority of cases, it is more economical to carry the highway over the railroad by means of a viaduct. For structures spanning one or two tracks, concrete deck girders are an economical type of construction. For more than two tracks, and where piers between tracks are not permissible, it is necessary to resort to steel plate girder construction. In place of using solid abutments with long wing walls, it has been found economical to add approach spans with open or skeleton abutments. These approach spans are made of sufficient length to keep the earth slopes clear of the track span. The open abutments eliminate the uncertainties of design encountered in solid abutments of any great height.

During the year 1927, preliminary designs were prepared for ten overhead grade structures, estimated to cost $372,000. This cost does not include the earthwork or pavement of the approaches. Complete detailed plans were also prepared for six grade separation projects, estimated to cost $265,000.

The largest overhead grade separation projects completed during the year were:

(a) Indiana Harbor Belt Railroad Overhead at Riverdale, shown in Figure 9. Spans: steel plate girders, two at 100 feet and one at 60 feet; concrete deck girders, sixteen at fifty feet; total length of structure between abutments 1,060 feet; width of roadway forty-three feet with two 6-foot sidewalks. Total contract price, including materials furnished by State $250,191.00.

(b) Overhead Structure over B. & O., C. & E. I. and I. C. Railroads at Tuscola, shown in Figure 10. Spans: concrete deck girders, two at sixty-three feet; four at forty-eight feet; five at forty-three feet; concrete slabs, one at thirty-three feet; one at sixteen feet; one at fourteen feet; length overall between abutments 596 feet; width of roadway twenty-four feet. Total cost, including State materials $53,210.11.

5. CLASSIFICATION OF BRIDGE WORK.—The various activities of the Bridge Section in 1927 may be classified as follows:

Plans Prepared.	Number.	Estimated Cost.
For Counties and Townships	183	$ 490,350.40
For State Bridges	219	3,501,141.27
For Road Contracts	8,048	2,272,153.57
Total	8,450	$6,263,645.24

Contracts Awarded.	Number.	Contract Price.
For Counties and Townships	145	$ 346,877.60
For State Bridges	165	1,790,512.33
Total	310	$2,137,389.93

Plans Approved for County Superintendents of Highways	1516
Old Bridges Investigated	2
Shop Drawings for Steel Bridges Approved	36
Shop Inspection of Steel Bridges	29

6. BRIDGES COMPLETED.—Aside from the overhead structures described above, the largest bridges completed in 1927 were:

(a) Fox River Bridge at Yorkville. Two reinforced concrete arch bridges, each consisting of three seventy-foot spans; roadway twenty-two feet, with two five-foot sidewalks. Total contract price, including materials furnished by State, $85,701.74. The completed project is shown in Figure 11.

(b) Sangamon River Bridge at Petersburg. All steel spans with reinforced concrete floor; spans three at 200 feet and two at 100 feet; roadway twenty-two feet, with one 5-foot sidewalk. Contract price, including materials, $125,866.10. The completed bridge appears in Figure 12.

(c) Fox River Bridge at McHenry. Reinforced concrete deck girders constructed on a combination of both horizontal and vertical curvature; spans eight at fifty-two feet; roadway thirty feet, with two 5-foot sidewalks. Contract price $93,843.50. Figure 13 is a very good view of the completed structure.

7. BRIDGES UNDER CONSTRUCTION.—The report of the Bureau of Construction covers the volume of bridge work constructed during the year. As is the case every year, many bridges were not completed and were carried over for completion in 1928. Probably the most important of these were the bridges across the Illinois River at LaSalle on Bond Issue Route 2, and at Florence on Bond Issue Route 36.

The general elevation and plan of the bridge at LaSalle are shown in Figure 15. The progress of the work early in the spring of 1928 is illustrated in Figure 14. When completed this bridge will consist of seven steel spans of 200 feet each and a channel span of 260 feet, which may be converted into a vertical lift by the addition of towers and operating machinery. The width of roadway is twenty-four feet. The contract price, including State materials, is $346,620.23.

The bridge at Florence on Route 36 will consist of eight steel spans of 215 feet each and a vertical lift span of the same length over the channel. The channel span will provide a horizontal clearance of 206 feet between fender piers and a vertical clearance, when open, of sixty-five feet above high water. The width of roadway is twenty-four feet. The contract for this project was awarded in 1926 for the sum of $530,640.00. The general plan of the bridge appears in Figure 16. Progress on the work, as it appeared in the spring of 1928, is illustrated in Figure 17.

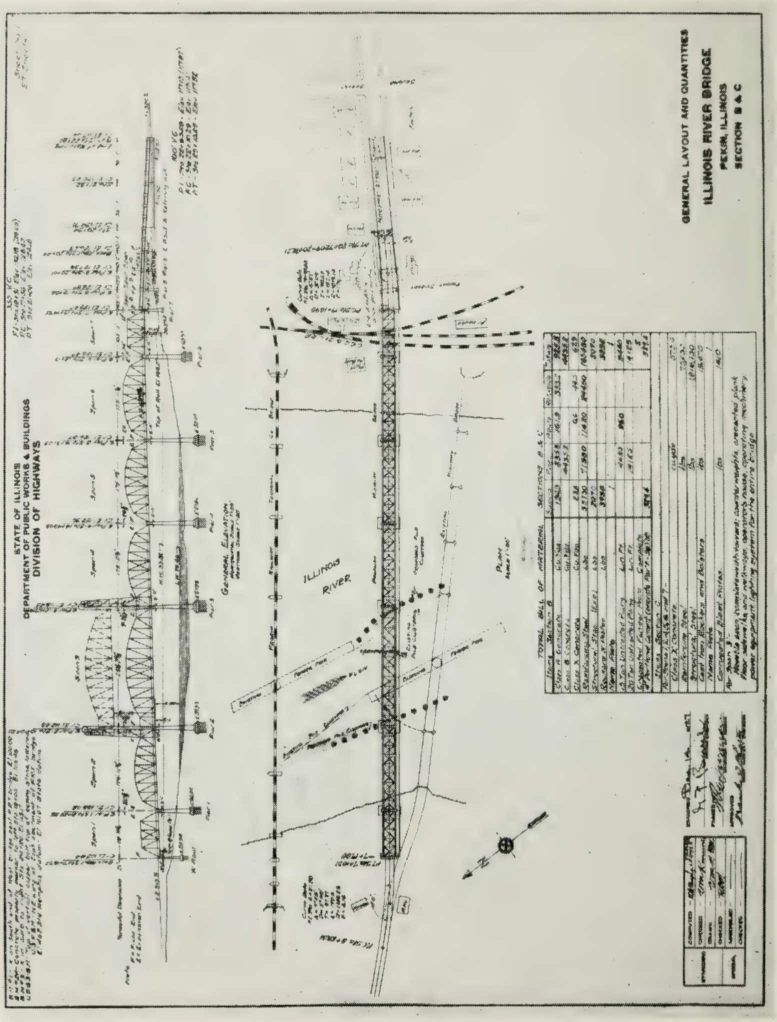


Figure 8.—Proposed Illinois River Bridge at Pekin.

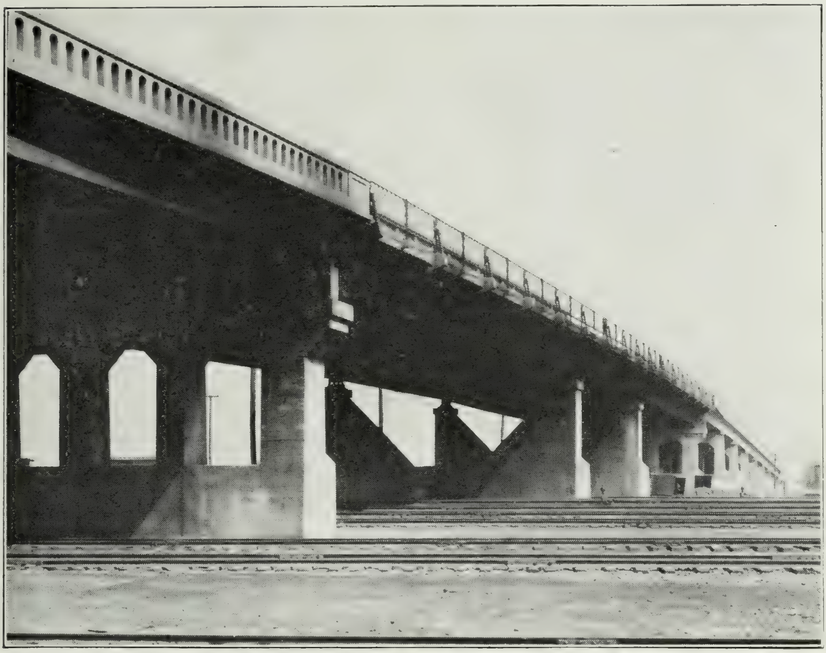


Figure 9.—Grade separation structure over tracks of Indiana Harbor Belt Railroad at Riverdale.

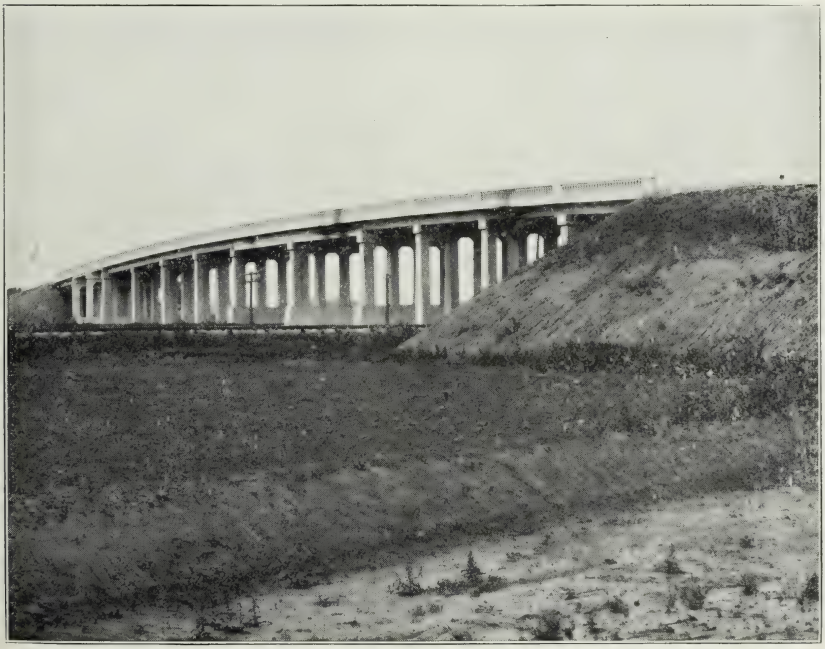


Figure 10.—Grade separation structure over tracks of B. & O., C. & E. I. and I. C. Railroads at Tuscola.

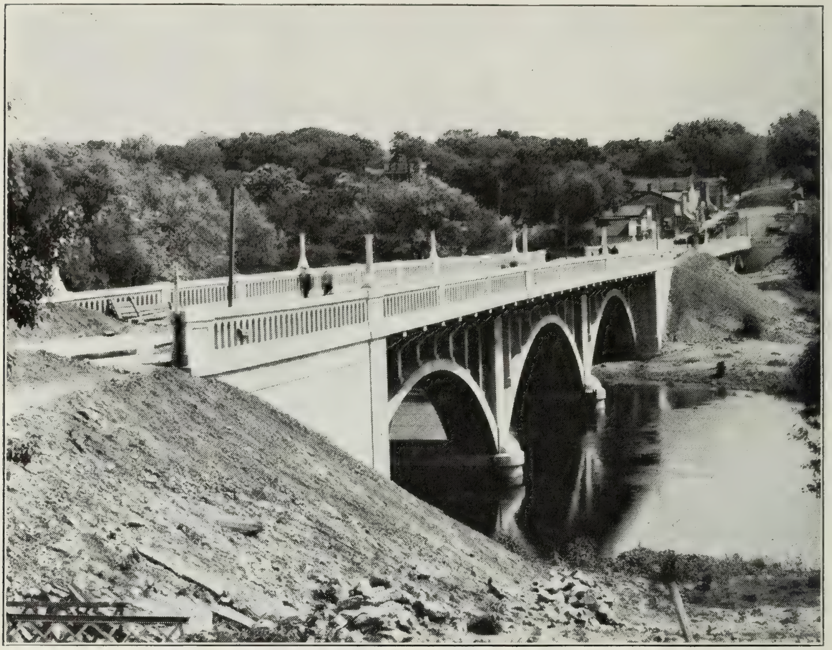


Figure 11.—Fox River Bridge at Yorkville.

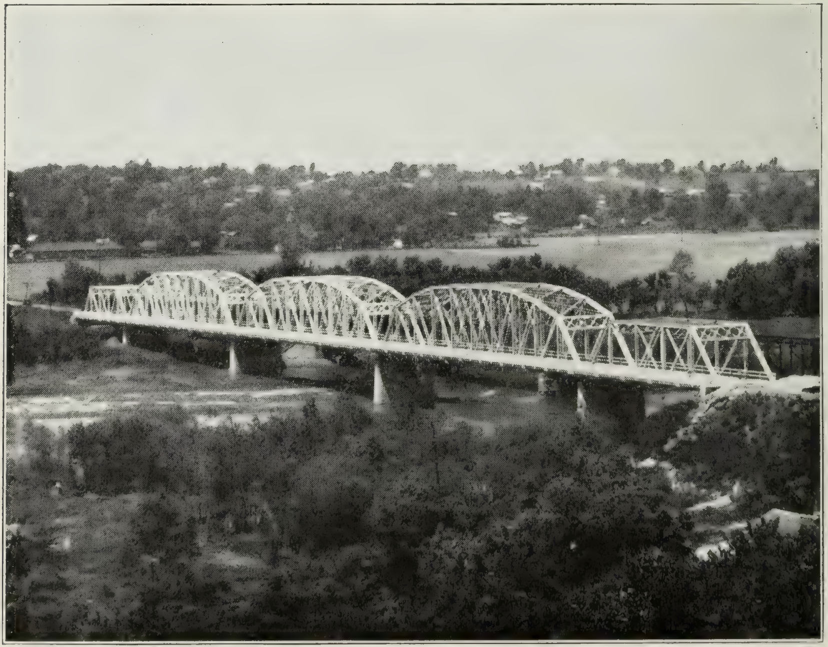


Figure 12.—Sangamon River Bridge at Petersburg.

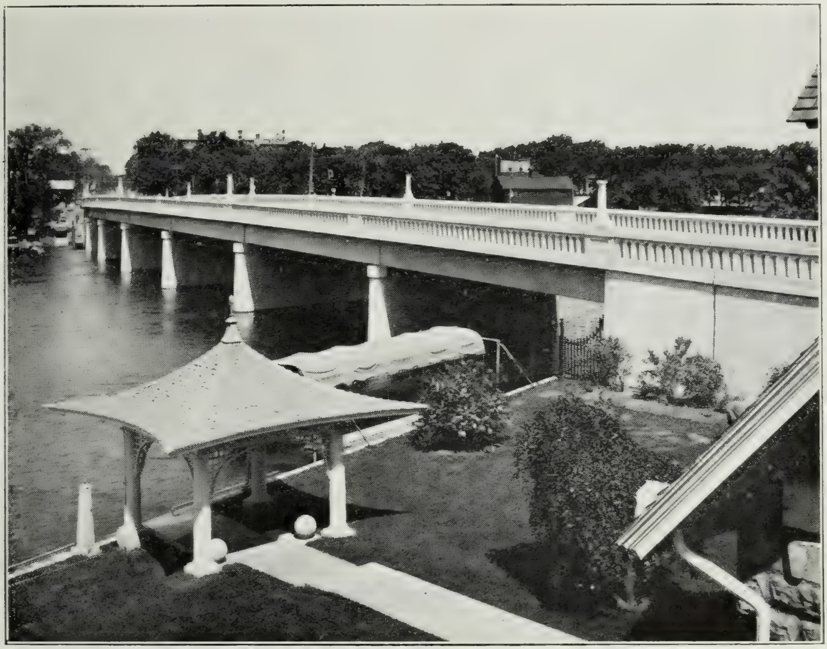


Figure 13.—Fox River Bridge at McHenry.

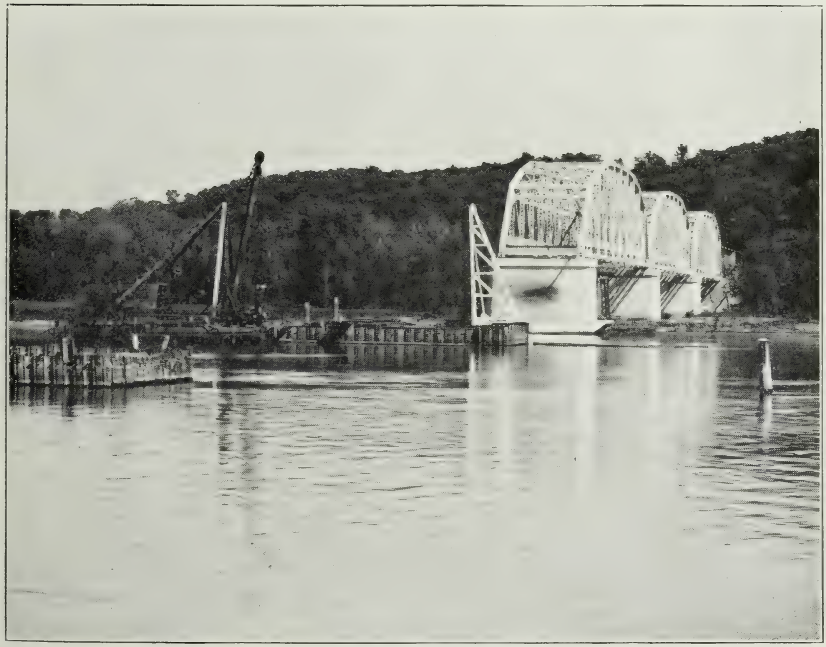
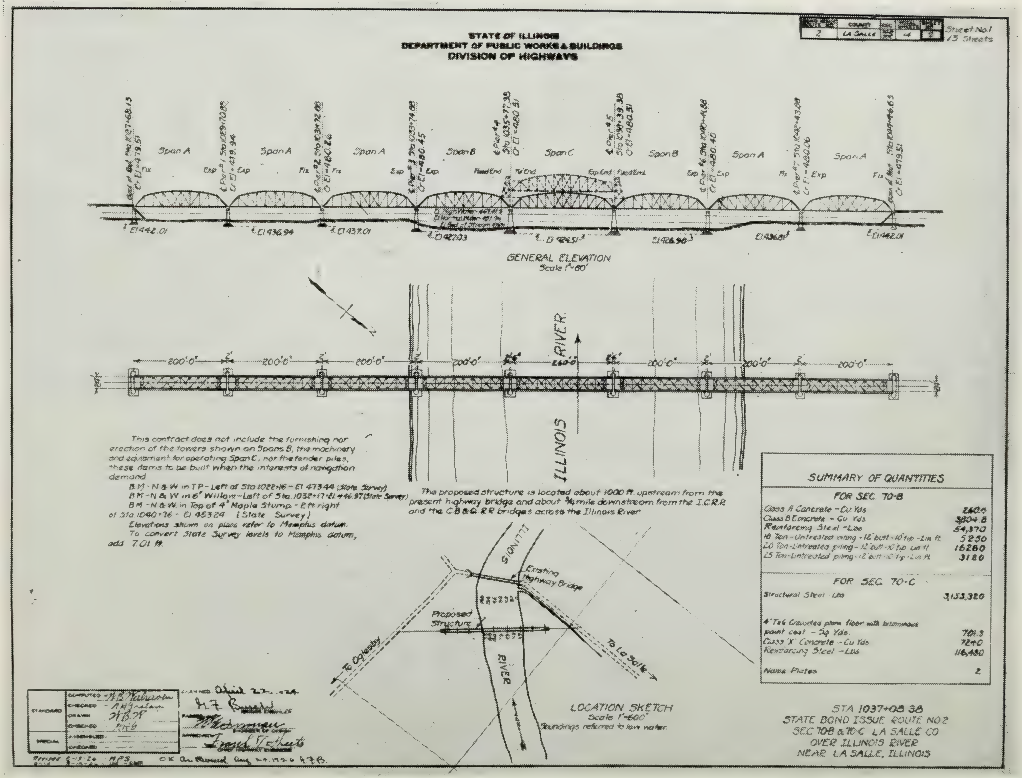


Figure 14.—Illinois River Bridge at La Salle. Construction view taken in Spring of 1928.



This contract does not include the furnishing nor erection of the towers shown on Spans B, the machinery and equipment for operating Span C, nor the fender piles, these items to be built when the interests of navigation demand.

B.M.-N. & W. in T.P.-Left of Sta 1022+16 - El 473.44 (State Survey)

B.M.-N. & W. in 6" Willow-Left of Sta. 1032+17-El 446.97 (State Survey)

B.M.-N. & W. in Top of 4" Maple Stump - 2 ft right of Sta 1040+76 - El 453.24 (State Survey)

Elevations shown on plans refer to Memphis datum.

To convert State Survey levels to Memphis datum, add 7.01 ft.

The proposed structure is located about 1000 ft. upstream from the present highway bridge and about ¾ mile downstream from the I.C.R.R. and the C.B.&Q. R.R. bridges across the Illinois River.

SUMMARY OF QUANTITIES	
FOR SEC. 70-B	
Class A Concrete - Cu Yds	2604
Class B Concrete - Cu Yds	3804.8
Reinforcing Steel - Lbs	54,370
18 Ton - Untreated piling - 12" butt - 10" tip - Lin ft	5250
20 Ton - Untreated piling - 12" butt - 10" tip - Lin ft	16280
25 Ton - Untreated piling - 12" butt - 10" tip - Lin ft	3180
FOR SEC. 70-C	
Structural Steel - Lbs	3,153,320
4" T&G Creosoted plank floor with bituminous paint coat - Sq Yds.	701.3
Class "X" Concrete - Cu Yds	72.40
Reinforcing Steel - Lbs	116,480
Name Plates	2

STA 1037+08.38
STATE BOND ISSUE ROUTE NO 2
SEC 70B & 70-C LA SALLE CO
OVER ILLINOIS RIVER
NEAR LA SALLE, ILLINOIS

Figure 15.—Illinois River Bridge at La Salle.

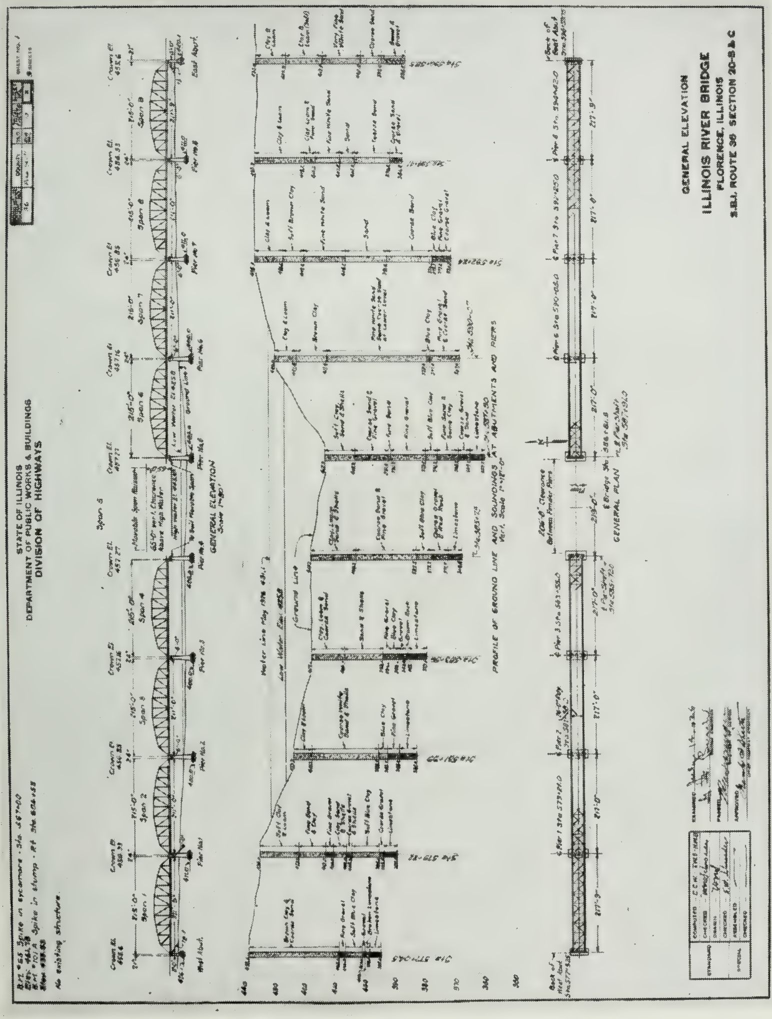


Figure 16.—Illinois River Bridge at Florence.

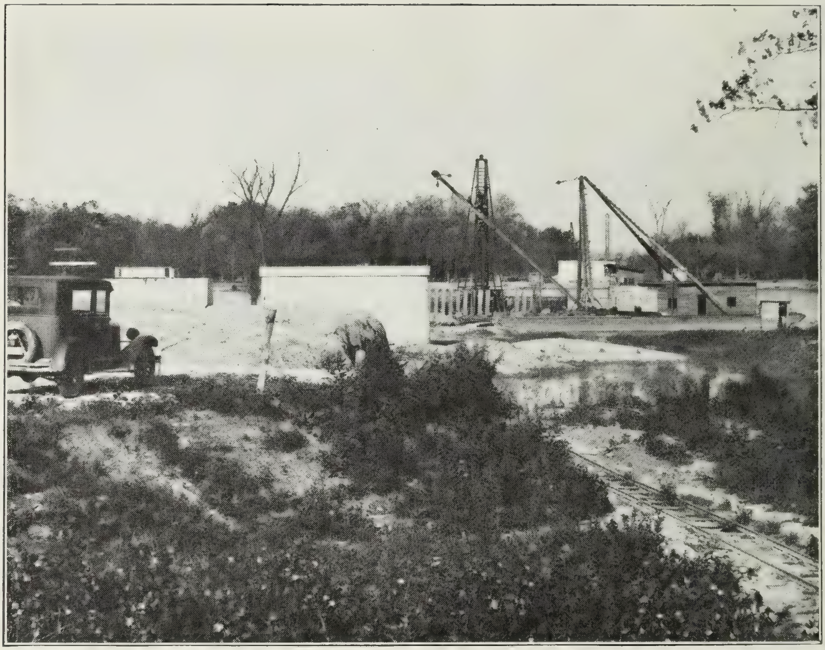


Figure 17.—Construction view of Illinois River Bridge at Florence, on Bond Route 36.

III. BUREAU OF CONSTRUCTION.

1. DUTIES OF THE BUREAU.—The Bureau of Construction has supervision over all road and bridge construction performed directly by the State and by the counties under Section 15d of the Road Law. This supervision calls for continuous field inspection from the Springfield office, conferences with the district construction organizations, checking the progress of each contract, and the analysis and study of equipment and methods of construction. It also includes final inspection of all work and approval of all final estimates before acceptance.

Each district is visited five or six times during the season by the Engineer of Construction or his assistant, and thus each construction job is inspected at least once, and sometimes two or three times during its progress. This permits a careful study of equipment and construction practice, making possible the standardizing of equipment and construction methods. This practice also tends to standardize the activities of our field engineers.

The Bureau of Construction also handles allocations of cement, has charge of the distribution of stone from the two State penitentiaries, maintains a rate division which assists in the adjustment of freight rates, and has general supervision over the several day labor construction units which have been operating since 1922.

2. 1927 CONSTRUCTION PROGRAM.—During 1927 there were completed 655.52 miles of pavement, the mileage of the various types being as follows:

Portland cement concrete	631.06
Brick	10.88
Sheet asphalt	1.00
Macadam and gravel	12.58
Total	655.52

Of this total 521.37 miles were constructed on the State bond issue system and 134.15 miles were constructed by the counties under Section 15d of the Road and Bridge Law. In addition there were completed 173.97 miles of heavy grading, totaling 3,446,485 cubic yards, and 178 bridges, totaling 71,774 cubic yards of concrete.

During 1927 the first pavement was constructed on the One Hundred Million Dollar bond issue system. This was laid May 17th by the Regenhardt Construction Company on Route 115 between Kankakee and Piper City. Starting of the work on this new system made possible the awarding of many heavy grading and bridge contracts in advance of paving.

Construction of twenty foot pavements, forty foot pavements and a large amount of widening to accommodate heavy traffic in metropolitan districts was much in evidence during 1927. This was likewise true on the 15d construction work. Particular attention was paid to widened pavements around Cook County.

3. QUANTITY AND QUALITY OF CONCRETE.—Portland cement concrete pavements are designed to take care of the maximum wheel loads permitted by statute. It is essential, therefore, that the concrete be of the highest quality obtainable, and every possible care is taken to guard against pavement deficient in thickness or inferior in quality.

The following precautions are taken to safeguard quality:

(a) Laboratory investigations are made to determine the best materials available and studies are made of the methods of proportioning which will give the greatest strength.

(b) Materials and construction features are inspected by experienced and trained engineers.

(c) The contract provides penalties for pavement deficient in thickness and these penalties are enforced.

(d) Cores are taken from the finished pavement. These are measured to obtain the actual thickness and are tested for compressive strength, weight per cubic foot and density.

The Department maintains an inspector at each cement mill, whose duty it is to test each car of cement before shipment. Each car of sand, gravel and stone is inspected for compliance with the specifications. Reinforcing steel, paint and bituminous materials are tested in a like manner and must meet the specifications before being used.

A State inspector is stationed at the contractor's proportioning plant and it is his duty to see that the proper amounts of fine and coarse aggregates and cement are used in each batch. In the case of the aggregates this is done by automatic measuring hoppers, and in the case of cement by the actual count of the sacks used. This insures control of the concrete mixture at all times.

An engineer or inspector of several years experience is constantly on duty at the mixer to see that all details of construction are properly handled. Under his supervision the subgrade is carefully checked to insure full thickness of pavement; the amount of mixing water is controlled; and frequent tests are made of the resulting concrete to see that it conforms to standard specifications for consistency. The details of construction such as the placing of the steel, the spading of the edges, the compaction of the concrete, and the smoothness of surface are watched. Finally, proper curing methods are required and no pavement is opened to traffic until it has cured the proper time to secure full strength. The engineer takes readings several times a day on the subgrade and later at the same identical spot on the pavement. This gives a check on the thickness of pavement being obtained.

As soon as the pavement is old enough to permit traffic on it, 6 to 8 cores per mile of pavement are taken. These are measured for thickness and then taken to the Materials Laboratory in Springfield where they are tested for compressive strength, weight per cubic foot and density. Thus on every section of road constructed a sample of the concrete is obtained at least every 1,000 feet and this sample is tested for thickness and strength, thereby insuring full quantity and proper quality.

It is felt that the expenditure for testing of materials, control of construction, an investigation of quantity and quality is justified in the assurance to the public that every mile of concrete pavement is thoroughly and carefully checked before final acceptance and payment is made.

4. CEMENT SHIPMENTS.—On May 20, 1927, the Department entered into contract for 3,000,000 barrels of cement and awards were made to nine companies. Nearly three times the amount of cement required was offered by the various companies submitting bids. The amount offered by companies located in Illinois, and those within a 100 mile radius, was sufficient to handle the requirements for the 1927 construction program. This fact is significant because there is an economic advantage in dealing with local mills, particularly from the standpoint of the contractor. Shipments can be delivered within two to three days of the order, thereby alleviating the necessity for storage. Prompt receipt of shipments also reduces the possibility of delays and shutdowns which are almost certain to occur when cement is shipped over a long distance due to traffic congestion. It has been the experience of the Department that inspection costs are less when shipments are made from the more centrally located mills, since there is more flexibility in the inspection organization.

5. DAY LABOR CONSTRUCTION.—Four day labor outfits were operated in different sections of the State during 1927. Work was done on ten different sections of concrete paving of 9-foot, 18-foot, and 40-foot widths, on two bridge sections, and two temporary surfacing jobs for the Bureau of Maintenance. In addition to this work, the regular guard fence construction program was carried on during the winter months.

Following is a tabulation of day labor work completed in 1927:

Type of Work.	No. of Sections.	Length in Miles.
40′ concrete pavement	1	.85
18′ concrete pavement	7	25.03
9′ Concrete pavement	2	8.35
Bridge work	2	
Temporary surfacing	2	
Guard fence	129	53.96

All of the above bridge work included grading, culvert and shoulder work, which is a part of the regular paving job. This work was handled in the same manner as contract work, and was subject to the same rigid inspection and supervision that contract work receives. The work completed in 1927 does not represent the capacity of the four outfits as a larger volume of work could have been completed had it been assigned.

Three of the paving outfits operated on ordinary construction jobs. The fourth completed the section of road between Hardin and Kampsville in Calhoun County, a very difficult and unique piece of construction. On this job the value of a State outfit was well demonstrated. The necessity of transporting all of the cement and the aggregates across the Illinois River by boat rendered difficult the submission of reasonable bids for contract work and, in addition, the flood conditions which shut down the job from September 1926 to May 1927, would have caused a contractor great financial loss. The value of day labor construction on such jobs as this is evident.

6. PENITENTIARY STONE.—A large amount of stone from the Illinois State Penitentiary at Joliet was utilized during 1927 on State bond issue construction, and for maintenance purposes. Large shipments from the Southern Illinois Penitentiary at Menard were made to the southern part of the State for use in the completion of several gaps on the State bond issue system, making it possible to open them to traffic during the winter months. This of course reduced appreciably the shipments to townships and, as a result, the requests for crushed stone were far in excess of the available supply.

The requirements for State bond issue work and maintenance purposes, in addition to the township applications, indicate that the production capacity of the two State penitentiaries could be doubled and still not supply the demands. Table XI shows the shipments of stone from the several penitentiaries.

TABLE XI—SHIPMENTS OF STONE FROM THE PENITENTIARIES.

Illinois State Penitentiary at Joliet.	
Requisitioned for Townships	48,028 cubic yards
Requisitioned for State Work	29,967 cubic yards
Shipments to Townships	18,631 cubic yards
Shipments to Day Labor	14,696 cubic yards
Shipments to Maintenance	12,674 cubic yards
Shipments to Penitentiary	2,597 cubic yards
Southern llinois Penitentiary at Menard.	
Requisitioned for Townships	31,850 cubic yards
Requisitioned for State Work	2,357 cubic yards
Shipments to Townships	5,418 cubic yards
Shipments to Maintenance	2,357 cubic yards

7. FREIGHT RATE DIVISION.—The Freight Rate Section was developed by the Bureau of Construction at a time when it was necessary to check rate reductions and war tax on every job. While this work has been materially reduced, the efforts of this Section have been directed to other traffic activities. Its principal duties now consist of checking rates, routing cement, aggregates and other shipments for contractors, securing rate reductions on a competitive basis, and analyzing rate increases.

8. CHARTS AND TABLES.—(a) Monthly Construction Progress. Figure 18 shows the progress of 1927 pavement construction compared with each year's progress since 1920. Figure 19 shows the weekly progress of pavement construction, which includes county 15d work. As in previous years, it is noticeable that the active construction season is from about June 1st to November 1st. In table XII is shown a general summary of 1927 construction. Table XIII gives a summary of construction completed during the year, arranged to show types and widths.

TABLE XII—SUMMARY OF 1927 CONSTRUCTION.

	Pavement miles.	Grading miles.	Bridges number.
Carried over from 1926	215.42	39.51	50
Awarded during 1927	771.16	228.78	203
Additions to existing contracts during 1927	39.69	35.90	17
Total awarded for 1927	1,026.27	304.19	270
Constructed during 1927	655.52	173.97	178
Carried over to 1928	370.75	130.22	92

NOTE.—The total pavement constructed during 1927 does not include the 1.31 miles of miscellaneous work built by Special Appropriations.

Paving Contractors, including County work under Section 15-d of the Road and Bridge Laws.... 109
Grading Contractors, including County 15-d work.... 63
Bridge Contractors, including County 15-d work.... 74

Total number of paving, grading and bridge contractors having State or County work in 1927.... 246
Paving sections under contract in 1927—
State Bond Issue and Federal Aid.... 229
County 15-d.... 109
Miscellaneous.... 2

Total.... 340
Non-ridged type pavement sections—
W. B. Macadam 2, Sheet Asphalt 2, Gravel 5, Total.... 9
Grading sections under contract in 1927—
S. B. I. & F. A. 70, County 15-d 73, Miscl. 2, Total.... 145
Bridge sections under contract in 1927—
S. B. I. & F. A. 154, County 15-d 25, Total.... 179

Five thousand eight hundred and fifty men and 1,350 teams were employed directly in the construction of road and bridge work in 1927.

TABLE XIII—SUMMARY OF DIFFERENT TYPES OF IMPROVED ROADS CONSTRUCTED IN 1927—LENGTH GIVEN IN MILES.

Type.	State bond issue.		Federal aid.		County 15d.	Total.
	60 million.	100 million.	60 million.	100 million.		
8′ concrete	1.45	0	0	0	0	1.45
9′ concrete	0	28.98	0	0	12.98	41.96
10′ concrete	0.82	0	0	0	15.60	16.42
16′ concrete	3.24	0	0	0	0	3.24
18′ concrete	73.16	163.37	77.97	118.19	26.09	458.78
20′ concrete	4.59	9.85	2.77	19.12	62.56	98.89
24′ concrete	0	0	0.34	0	0	0.34
30′ concrete	0	0	0	0	1.23	1.23
40′ concrete	5.83	0	0	0.81	2.11	8.75
18′ brick	3.15	4.93	2.80	0	0	10.88
10′ W. B. macadam	0	0	0	0	5.03	5.03
10′ sheet asphalt	0	0	0	0	1.00	1.00
14′ gravel	0	0	0	0	7.40	7.40
18′ gravel	0	0	0	0	0.15	0.15
Total	92.24	207.13	83.88	138.12	134.15	655.52

1.31 miles of pavement built by special appropriation is not included in the above totals

(b) Cost of eighteen-foot Concrete Pavement. Figure 20 gives the cost analysis of a mile of concrete pavement. This was compiled from the figures for 120 miles of eighteen-foot concrete road, the sections taken from various parts of the State, and includes the heavy grading and bridge work done on these sections. An analysis similar

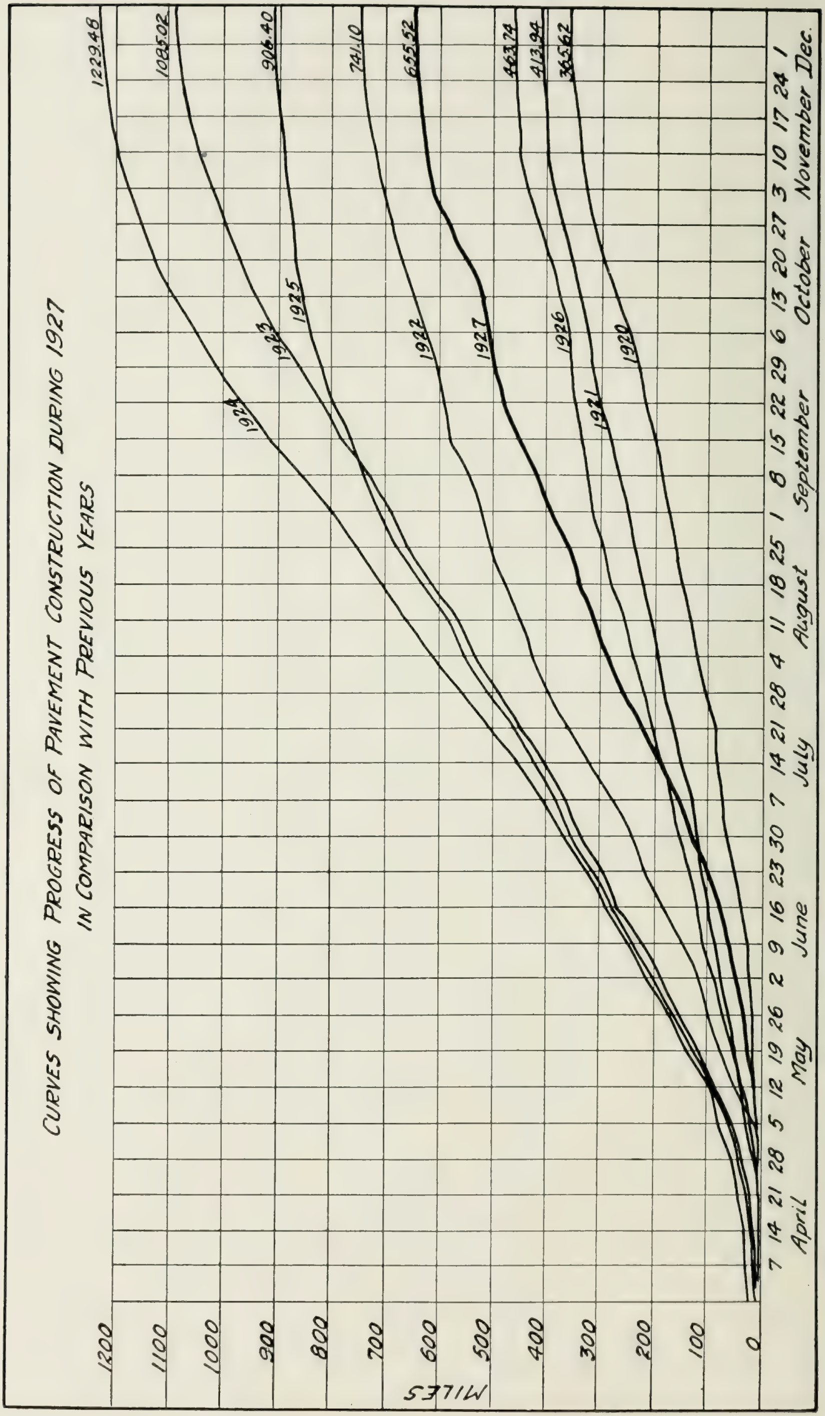


Figure 18.—Curves showing progress of pavement construction during 1927 in comparison with previous years.

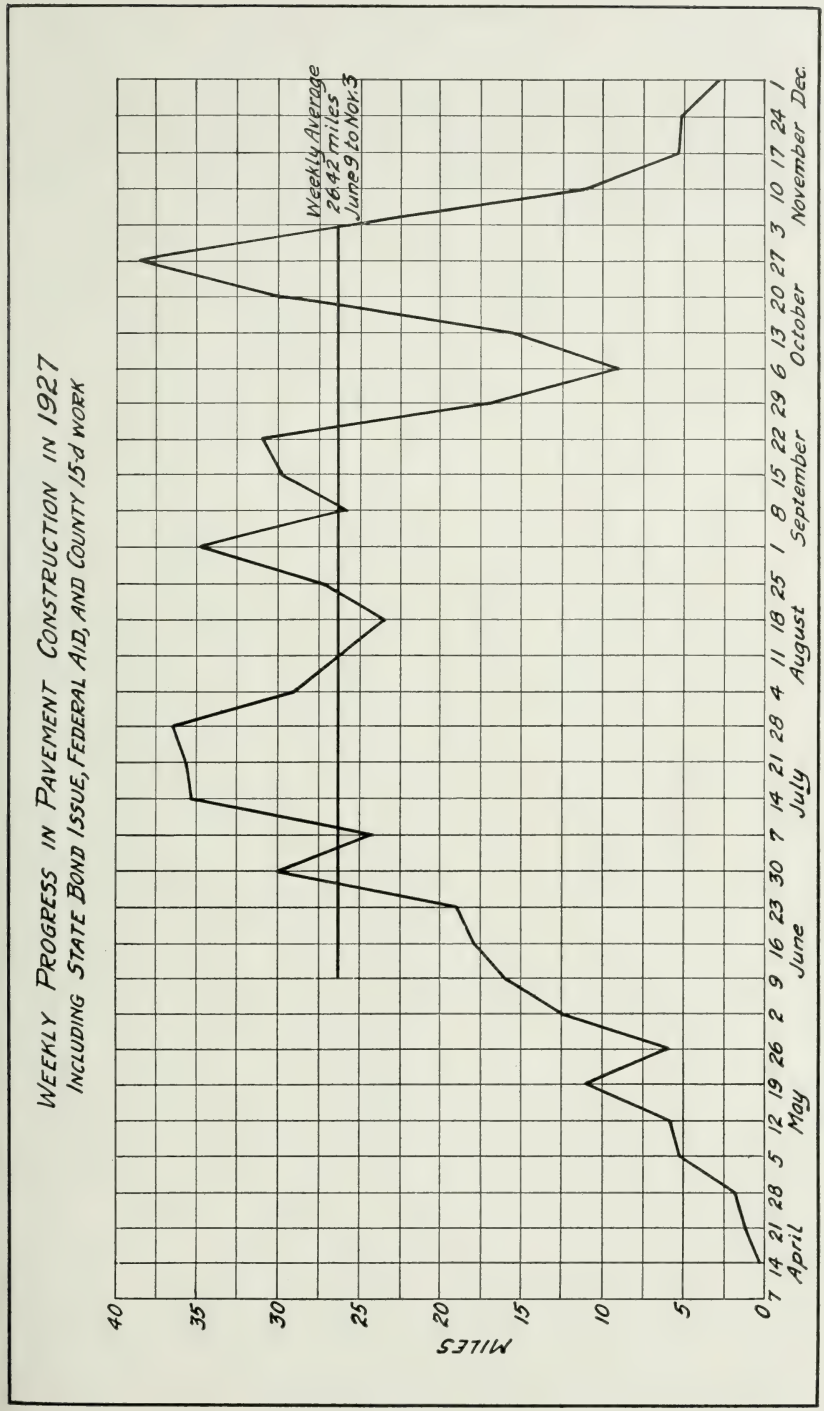


Figure 19.—Curve showing weekly progress in pavement construction in 1927.

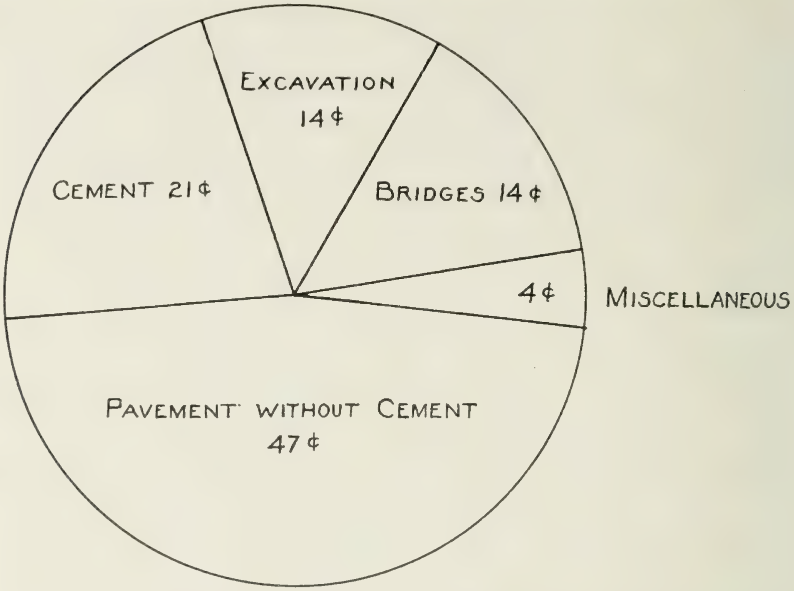


Figure 20.—Cost analysis diagram of 18-foot concrete pavement.

NOTE: The information compiled from 125 miles of 18-foot concrete pavement sections taken from all parts of the State and includes all heavy grading and bridge contracts on these sections.

Miscellaneous includes guard fence, catch basins, section markers, gutters and all extra work not included under other headings.

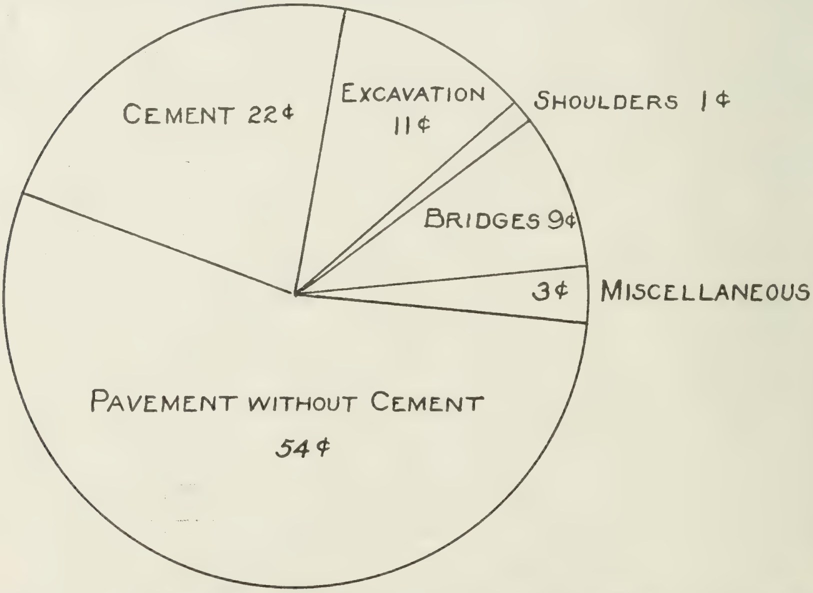


Figure 21.—Cost analysis diagram of 18-foot concrete pavement for the years 1922 to 1927, inclusive.

NOTE: This information compiled from 878 miles of 18-foot concrete pavement. Sections taken from all parts of the State and includes all heavy grading and bridge contracts on these sections.

Miscellaneous includes guard fence, catch basins, section markers, gutters and all extra work not included under other headings.

to this has been made each year since 1922 and an "average cost" for the six year period is shown by Figure 21. It is noticeable that during the six year period there has been little variation in the cost of the several component parts making up the total.

(c) Improved Mileage by Counties. In Table XIV is shown the mileage of pavement available to traffic in each county on January 1st, 1928, this being arranged under the headings of State Bond Issue, Federal Aid, State Aid and 15d.

TABLE XIV—TOTAL MILEAGE OF PAVEMENT AVAILABLE TO TRAFFIC IN EACH COUNTY JANUARY 1, 1928.

County.	State bond issue.	Federal aid.	State aid.	County 15d.	Miscellaneous.	Total.
Adams	64.49	15.56	4.21	0	0	84.26
Alexander	3.43	0	9.58	19.62	0	32.63
Bond	10.05	20.86	1.48	7.54	0	39.93
Boone	11.74	0	3.70	0.34	0	15.78
Brown	10.27	7.62	0	0	0	17.89
Bureau	29.52	55.91	9.72	17.97	0	113.12
Calhoun	10.15	0	1.30	0	0	11.45
Carroll	25.16	24.31	3.53	5.97	0	58.97
Cass	12.18	14.36	3.93	0	0	30.47
Champaign	52.81	19.61	2.54	126.75	0	201.71
Christian	47.40	7.06	0	0	1.06	55.52
Clark	24.14	30.90	3.23	6.26	0	64.53
Clay	38.97	3.54	1.35	0	0	43.86
Clinton	25.00	11.88	1.38	0	0	38.26
Coles	32.60	11.76	0.44	1.79	0	46.59
Cook	72.91	24.39	43.25	381.34	1.34	523.23
Crawford	38.28	0	5.13	0	0	43.41
Cumberland	9.08	20.93	2.23	8.47	0	40.71
DeKalb	29.96	28.50	6.01	2.61	0	67.08
DeWitt	21.39	0	0	0	0	21.39
Douglas	20.93	9.58	1.77	18.11	0	50.39
DuPage	42.31	12.18	0.10	49.22	0	103.81
Edgar	17.55	21.76	3.67	2.03	0	45.01
Edwards	17.47	0	0.88	0.54	0	18.89
Effingham	32.02	24.44	0.70	0.38	0	57.54
Fayette	27.99	25.15	1.93	0	0	55.07
Ford	31.08	28.90	2.02	0	0	62.00
Franklin	34.75	6.49	3.14	5.07	0	49.45
Fulton	46.07	44.99	2.82	3.44	0.39	97.71
Gallatin	16.07	0	0	0	0	16.07
Greene	19.50	5.63	0	0	0	25.13
Grundy	20.38	26.46	4.04	3.12	0	54.00
Hamilton	18.69	0	0	0	0	18.69
Hancock	27.53	22.15	0	0	0	49.68
Hardin	0	13.99	0	0	0	13.99
Henderson	17.69	0	0.51	0	0	18.20
Henry	48.73	6.26	2.41	0	0	57.40
Iroquois	46.84	57.68	9.21	118.81	0	232.54
Jackson	41.20	3.55	1.50	0	0.25	46.50
Jasper	38.23	0	0	0	0	38.23
Jefferson	23.53	12.31	0.72	0	0	36.56
Jersey	24.50	7.16	0	0.15	0	31.81
JoDaviess	44.78	11.28	0.26	0	0	56.32
Johnson	17.24	5.48	0	0	0	22.72
Kane	17.00	21.81	9.16	62.39	0	110.36
Kankakee	54.63	53.22	4.14	15.27	0	127.26
Kendall	9.96	9.41	3.22	0	0	22.59
Knox	43.18	17.40	0	0	0	60.58
Lake	37.52	41.21	6.17	89.42	0	174.32
LaSalle	91.49	30.51	10.08	0	1.97	134.05
Lawrence	39.16	0	3.63	0	0	42.79
Lee	9.28	57.60	1.77	11.65	3.21	83.51
Livingston	59.09	26.90	4.74	4.46	0.57	95.76
Logan	0.09	23.94	3.18	0	0	27.21
Macon	41.14	10.66	0	0	0	51.80
Macoupin	12.43	44.46	0.56	3.35	0	60.80
Madison	16.82	52.62	10.46	30.18	1.40	111.48
Marion	38.66	6.61	1.55	0	0	46.82
Marshall	23.68	19.03	0	0	0	42.71

TABLE XIV—Concluded

County.	State bond issue.	Federal aid.	State aid.	County 15d.	Miscellaneous.	Total.
Mason	5.46	27.88	0.57	3.26	0	37.17
Massac	1.06	9.66	0	0	0	10.72
McDonough	33.37	35.04	0	0	0	68.41
McHenry	44.60	42.85	3.88	0	0	91.33
McLean	72.36	68.20	1.85	0.80	0.14	143.35
Menard	8.28	13.44	1.53	1.99	0.96	26.20
Mercer	21.79	9.03	0	0	0	30.82
Monroe	10.87	15.30	0.47	0.36	0	27.00
Montgomery	15.85	17.76	0	0	0	33.61
Morgan	36.66	6.12	1.61	0.37	0	44.76
Moultrie	19.26	8.90	3.81	0	0	31.97
Ogle	53.59	37.54	8.04	18.76	0	117.93
Peoria	23.13	58.55	5.14	18.94	0.33	106.09
Perry	36.81	16.48	0	0	0	53.29
Piatt	42.21	0.73	5.78	10.06	0	58.78
Pike	19.91	18.36	3.78	0	0	42.05
Pope	0	10.99	0	0	0	10.99
Pulaski	1.82	14.81	0.69	0	0	17.32
Putnam	6.78	6.43	0.99	1.58	0	15.78
Randolph	30.09	14.51	0	0	0	44.60
Richland	12.37	7.35	0	0	0	19.72
Rock Island	34.16	0.67	1.84	15.64	0	52.31
Saline	33.47	20.22	1.55	0	1.60	56.84
Sangamon	43.04	57.88	8.64	17.77	0	127.33
Schuyler	6.35	34.03	1.63	5.15	0	47.16
Scott	20.46	0	0	0	0	20.46
Shelby	49.00	0	0.61	0.60	0	50 21
Stark	16.40	3.38	0	0	0	19.78
St. Clair	43.07	37.14	3.01	40.60	0.53	124.35
Stephenson	30.52	0	4.35	1.79	0	36.66
Tazewell	23.88	26.95	1.51	5.07	0	57.41
Union	11.36	10.87	0	0	0.93	23.16
Vermilion	60.13	5.99	1.15	141.23	3.71	212.21
Wabash	24.52	0	1.72	0	0	26.24
Warren	34.57	18.58	2.02	1.14	0	56.31
Washington	48.03	0.42	0	0	0	48.45
Wayne	47.32	0	0	0	0	47.32
White	29.54	5.85	6.20	0	0	41.59
Whiteside	13.05	46.50	6.61	4.27	5.52	75.95
Will	70.66	44.03	11.96	36.08	0.78	163.51
Williamson	33.23	0	0.12	10.12	0	43.47
Winnebago	28.02	4.78	7.34	47.71	0	87.85
Woodford	29.15	26.60	1.40	0	0	57.15
Total	2,964.94	1,841.83	297.15	1,379.54	24.69	6,508.15

NOTE:—The above totals include the following various types:

Concrete	6,068.60 miles
Brick	143.18 miles
Sheet asphalt	34.05 miles
Bituminous concrete	9.38 miles
Bituminous macadam	17.31 miles
W. B. macadam	59.94 miles
Gravel	175.69 miles
Net mileage available to traffic	6,508.15 miles

NOTE.—Federal Aid Improvement is on our State Bond Issue System.

Brief Summary of Mileage in State as of January 1, 1928:

Total mileage built in State including State Bond Issue, State Aid, County 15d, Township and Miscellaneous	6,746.56
Deduct mileage of pavement that has been replaced or widened	238.41
Total mileage in State available to traffic	6,508.15

(d) Progress Charts. Figure 22 shows a typical progress chart used on pavement construction. A similar one is used on bridge work. This chart was developed in order to keep a close check on each contractor's progress and that each job might be completed within the time limit as specified.

Before a contract is awarded, a progress chart must be submitted which shows the order of handling the work and the estimated weekly progress. It is first checked over in the Bureau of Construction and if any revisions are necessary, they are suggested and agreed to before the contract is signed. A copy of the approved chart is sent to the District Office and becomes a working schedule of the contractor. In case the contractor falls behind this schedule appreciably, he is called into the office, and a continued lack of progress usually results in a call for a conference with contractor and bonding company. In submitting this chart the contractor is supposed to take into consideration weather conditions and such delays as may commonly occur on the average construction job. It is a conservative estimate of progress and it is understood that if delays occur at any particular season of the year, the outfit and equipment must be expanded to complete the work within the time limit as stated. Two years experience with this chart has proved its definite value.

(e) Final Inspection and Payment Estimates. It is the duty of the Engineer of Construction to make a final inspection of all work, and to pass and approve all monthly and final estimates. During the year 1927 there were passed 2,256 monthly estimates, forty semi-final estimates, 204 final estimates and 20 supplementary final estimates.

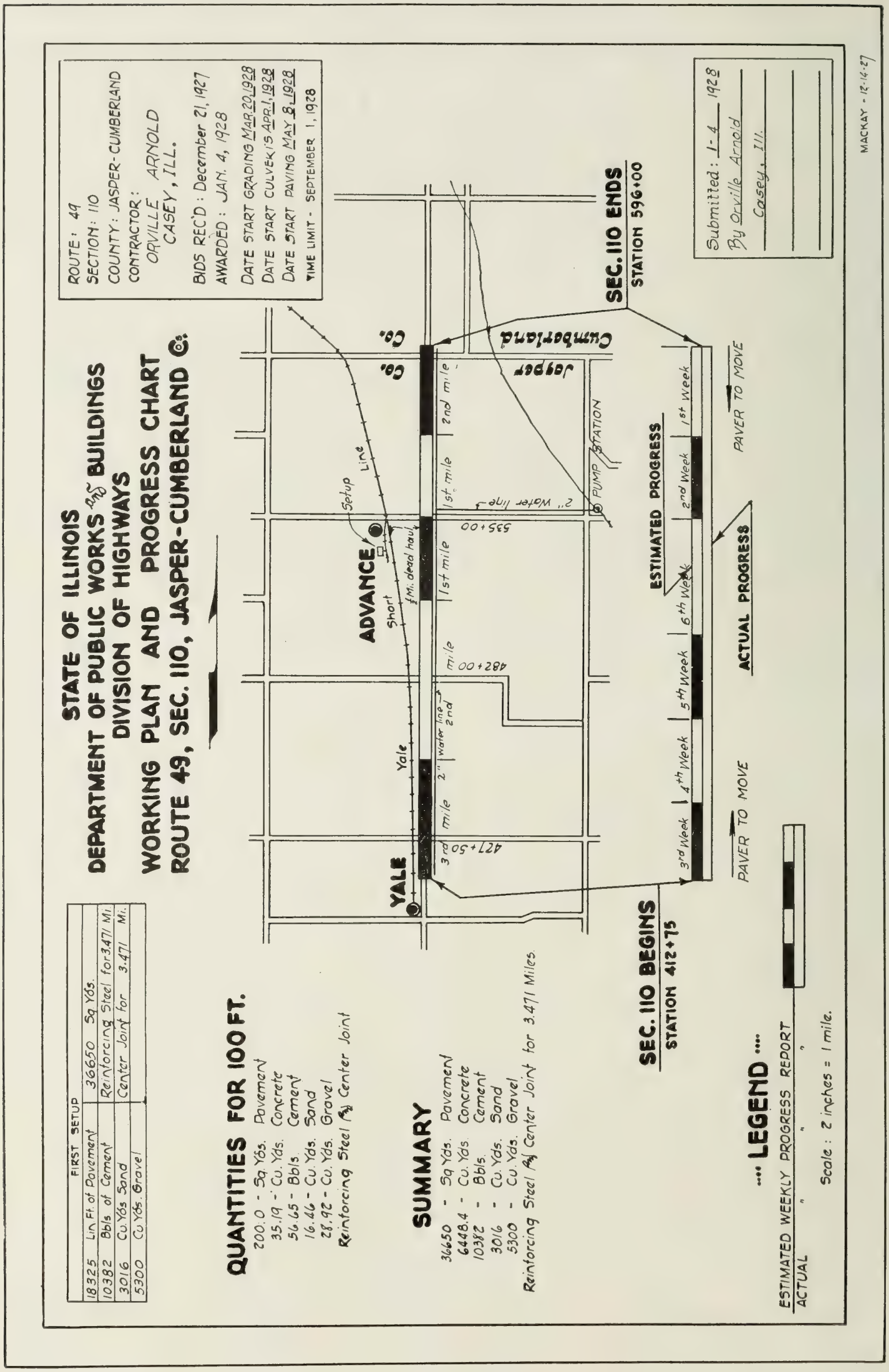


Figure 22.—A typical progress chart used on pavement construction.

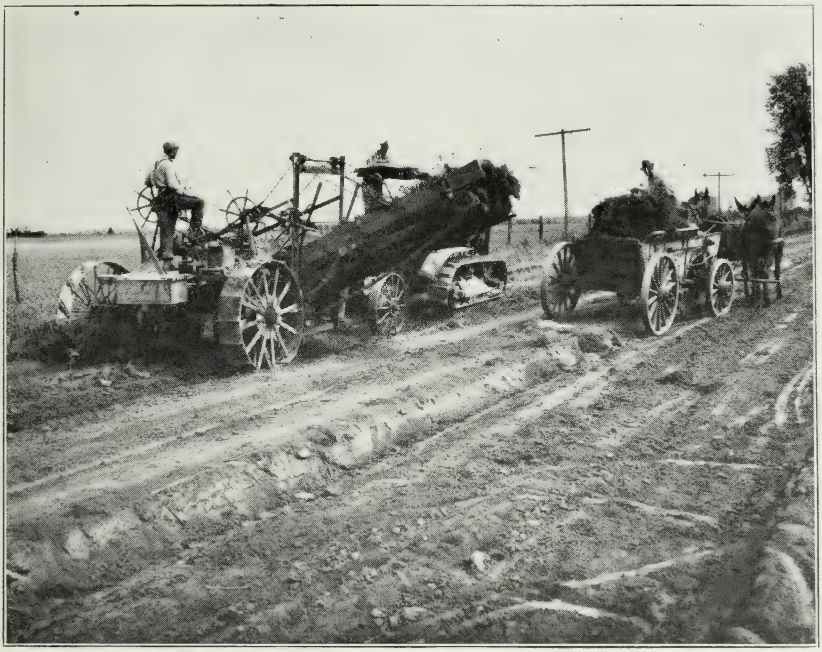


Figure 23.—Construction of a Concrete Pavement: Moving dirt with elevating grader and teams.

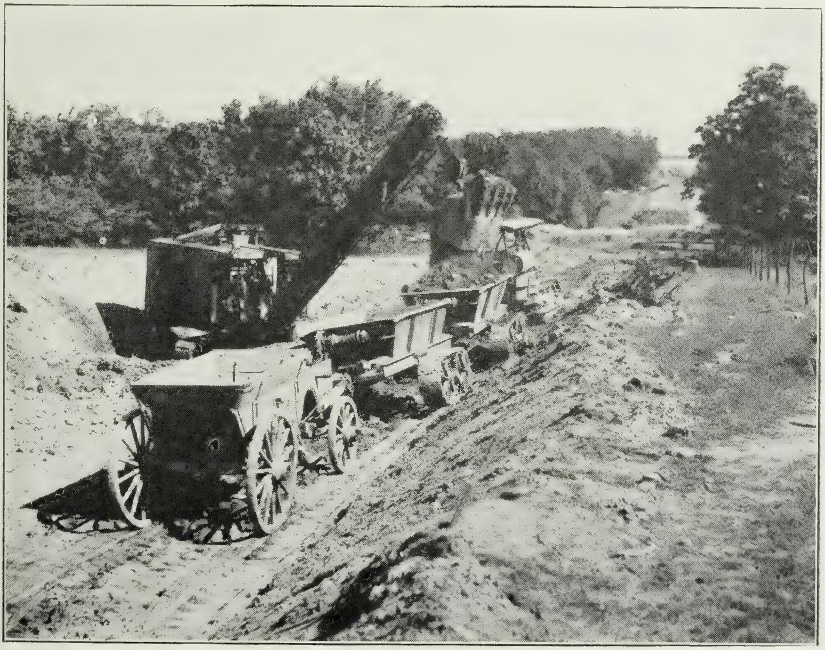


Figure 24.—Construction of a Concrete Pavement: Moving dirt with steam shovel and crawler dump wagons.

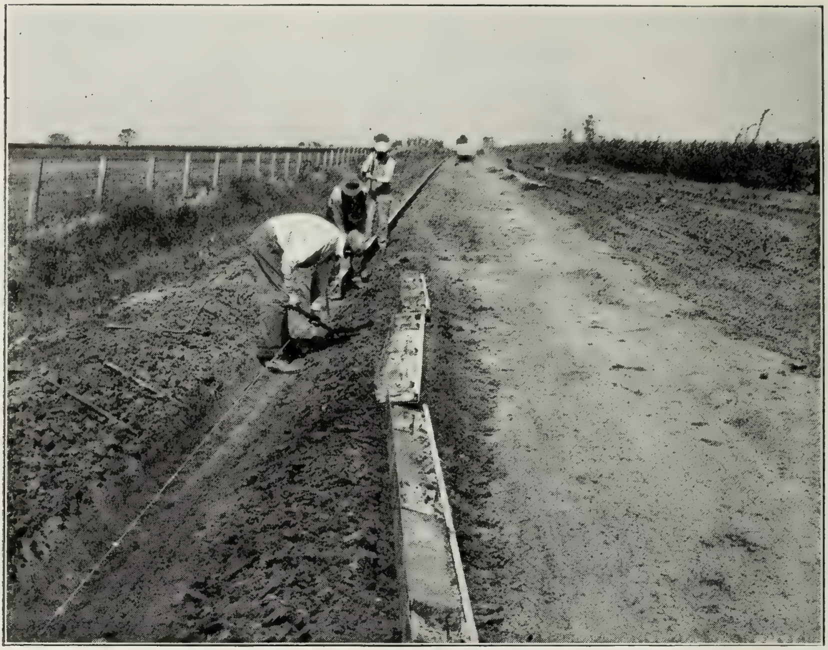


Figure 25.—Construction of a Concrete Pavement: Setting forms ahead of mixer.

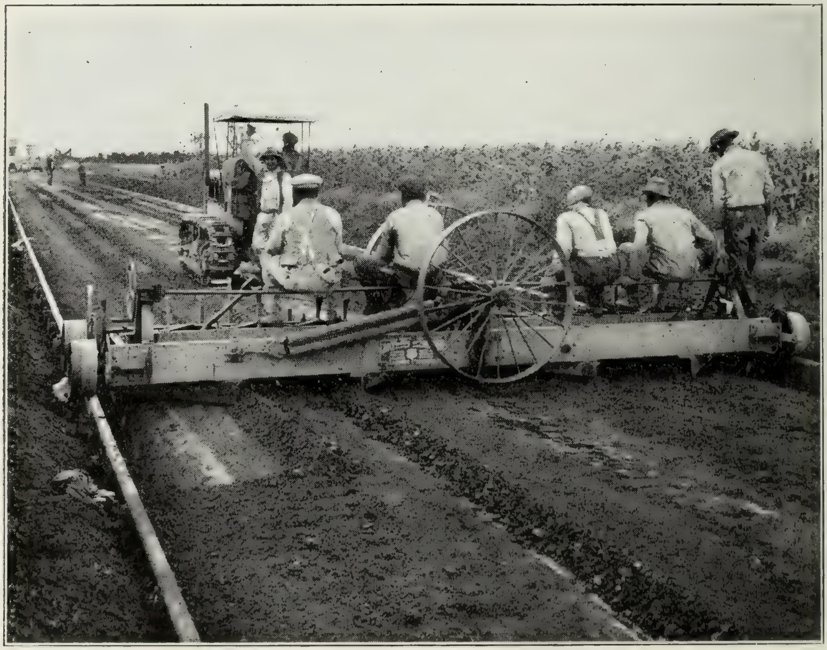


Figure 26.—Construction of a Concrete Pavement: Cutting subgrade to proper depth and shape.

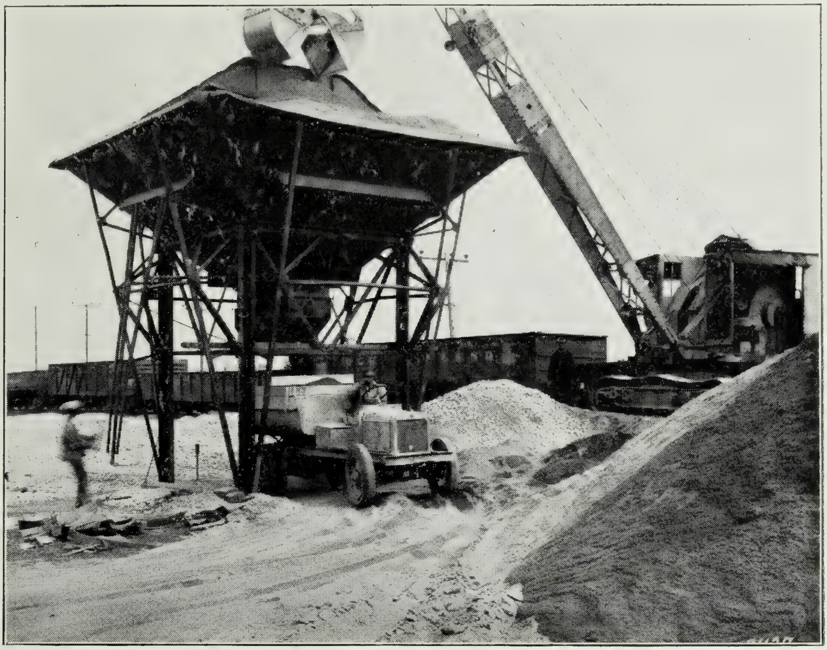


Figure 27.—Construction of a Concrete Pavement: Loading and proportioning aggregate.

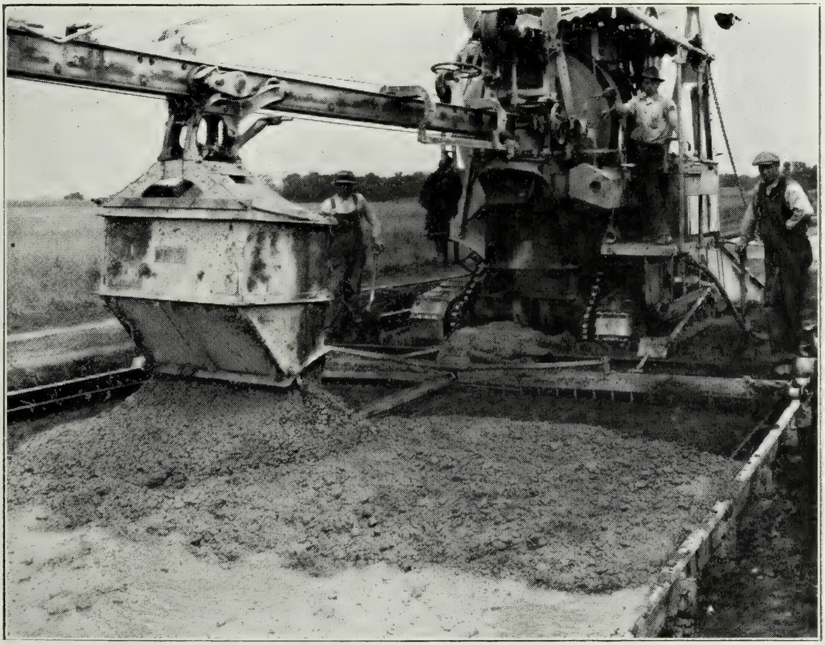


Figure 28.—Construction of a Concrete Pavement: Placing mixed concrete.

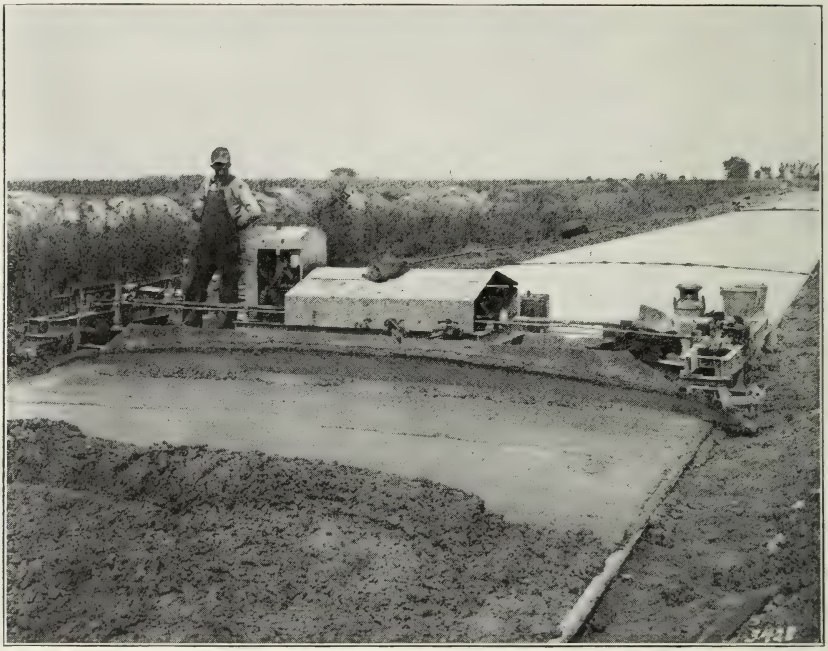


Figure 29.—Construction of a Concrete Pavement: Mechanical finishing.

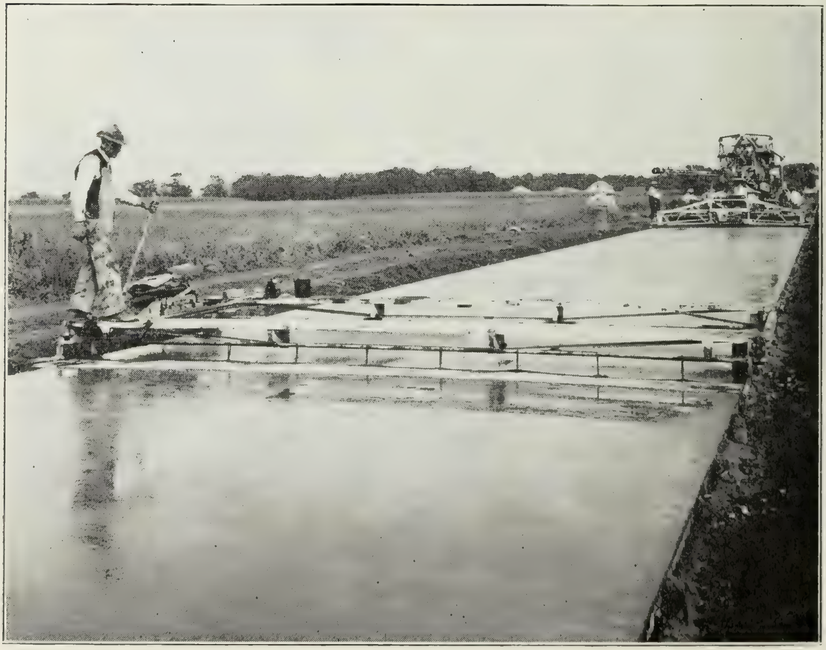


Figure 30.—Construction of a Concrete Pavement: The final belting.

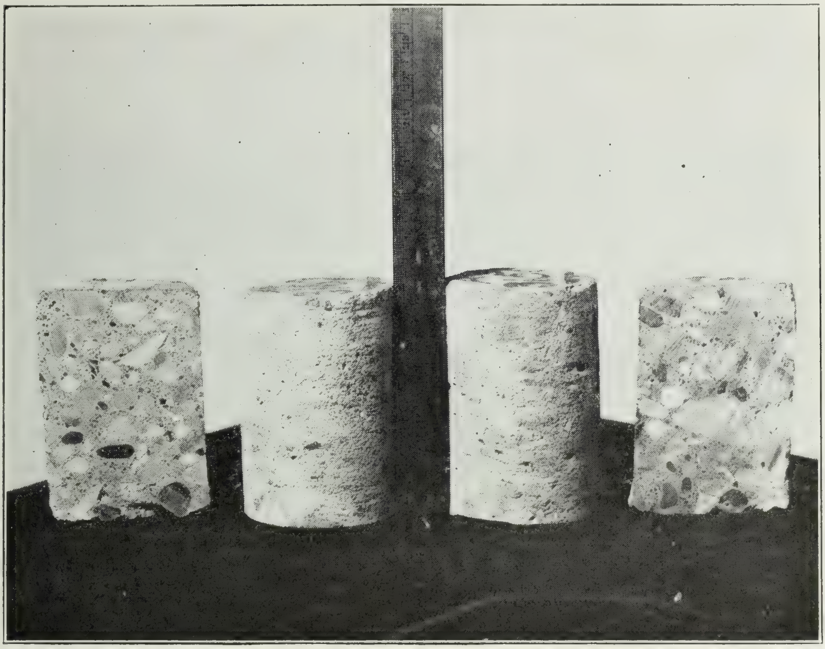


Figure 31.—Construction of a Concrete Pavement: Typical cores taken from the pavement.

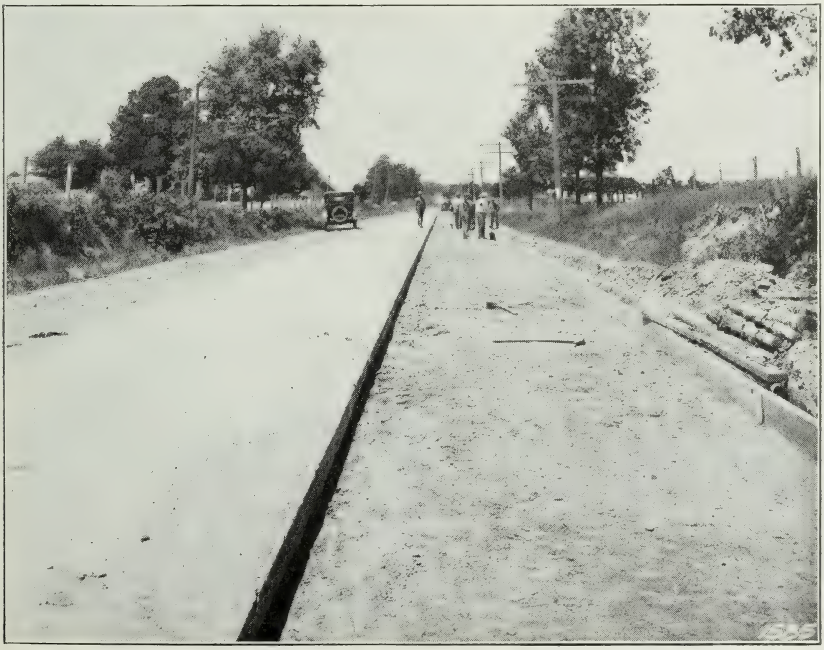


Figure 32.—Widening old 10-foot pavement.

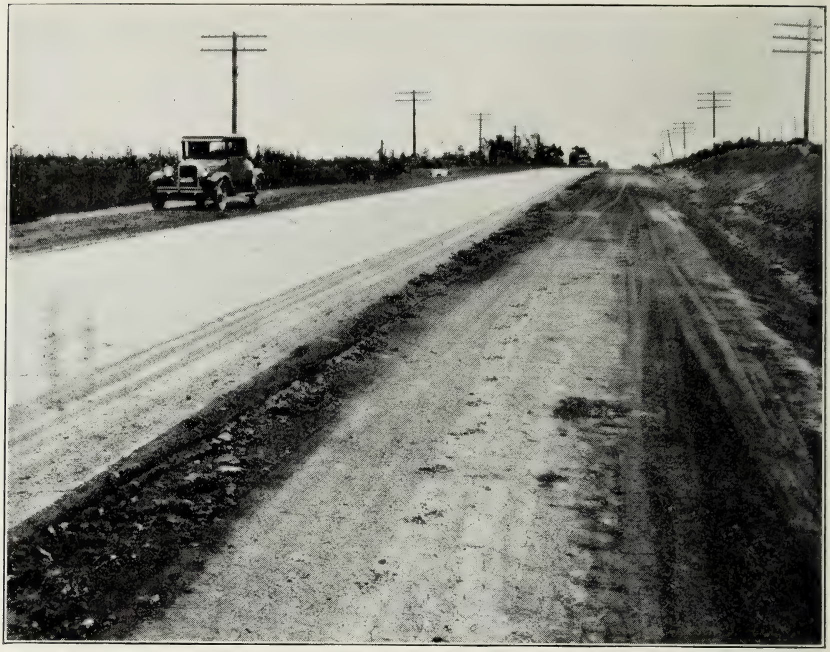


Figure 33.—The new standard 11-foot shoulders.

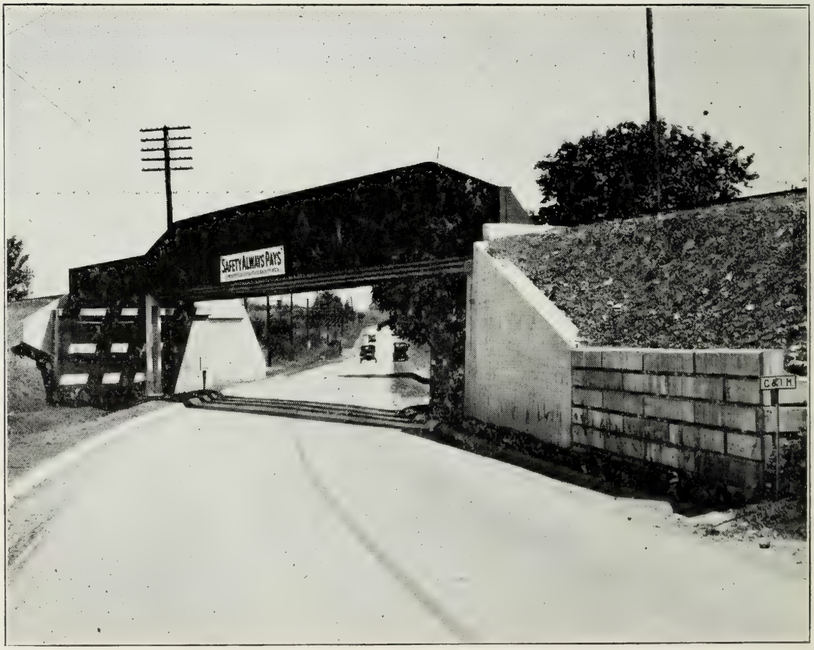


Figure 34—C. & I. M. subway on Bond Routes 4 and 24 near Springfield.

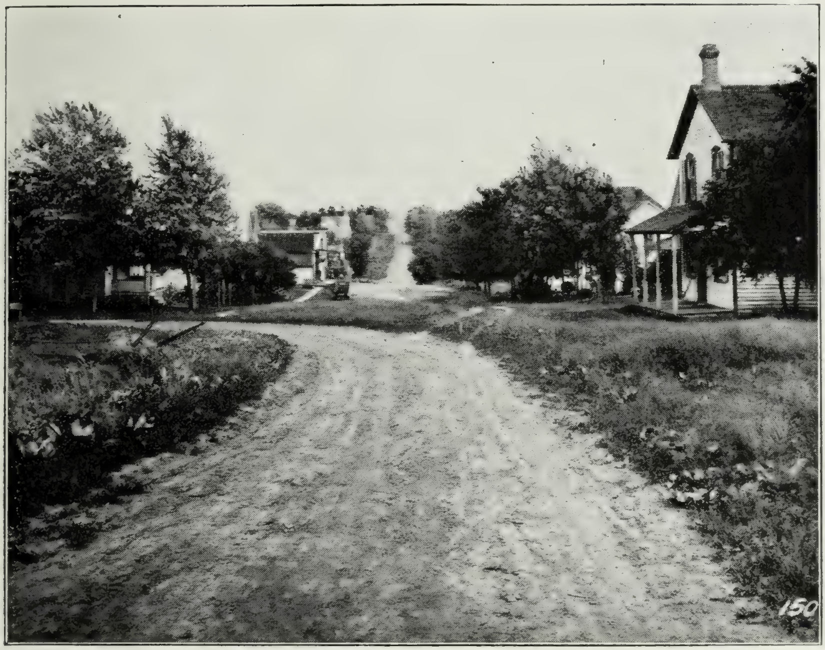


Figure 35.—Before Construction: Bond Route 5, Section 25.

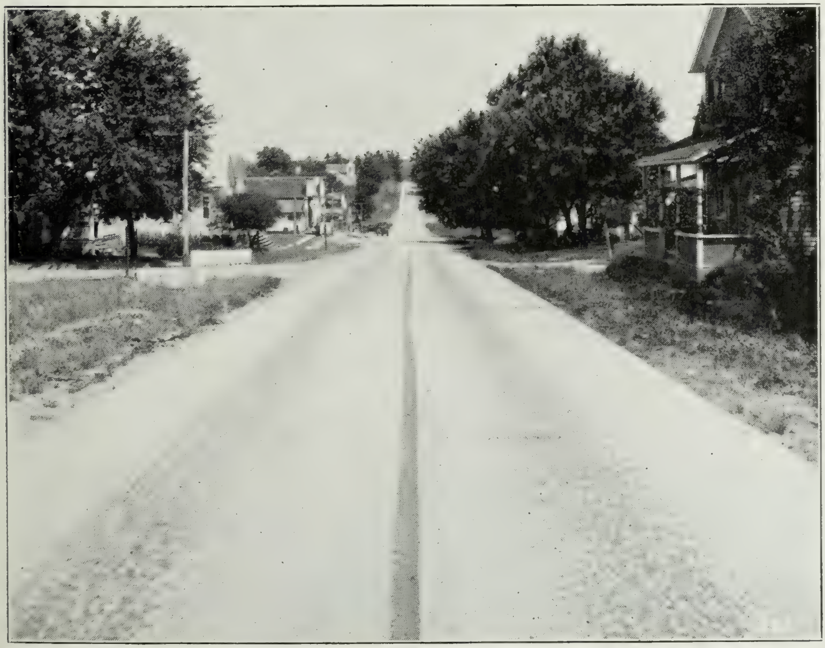


Figure 36.—After Construction: Bond Route 5, Section 25.

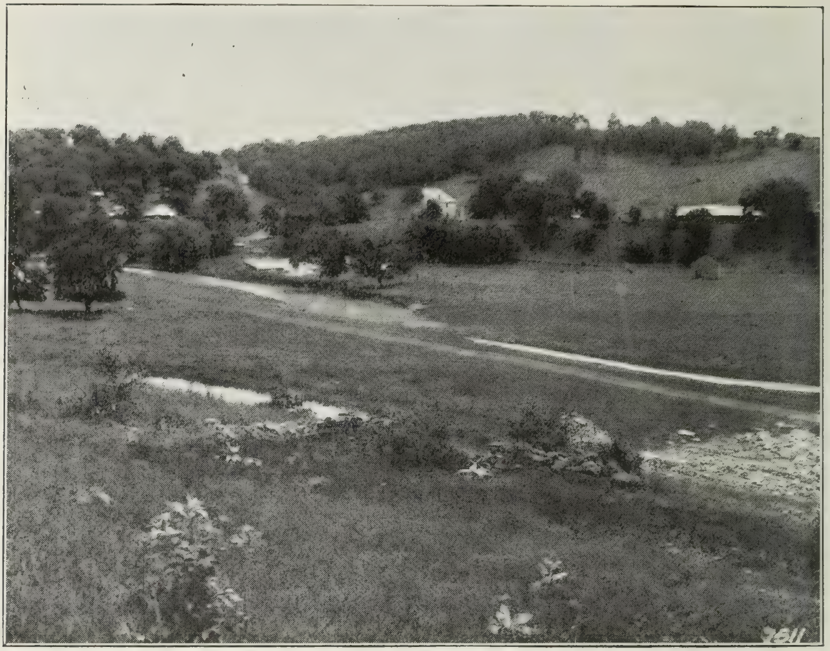


Figure 37.—Before Construction: Bond Route 5, Section 30.

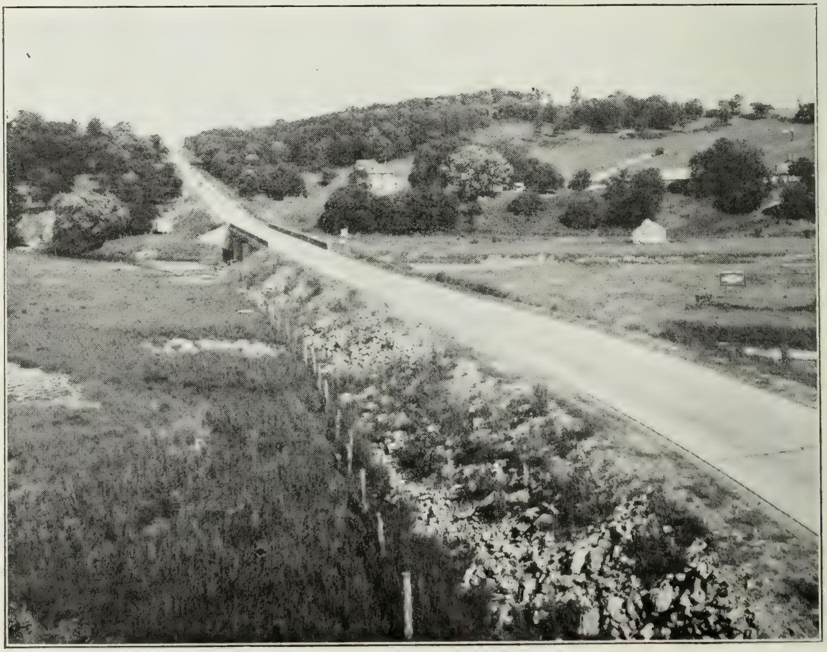


Figure 38.—After Construction: Bond Route 5, Section 30.

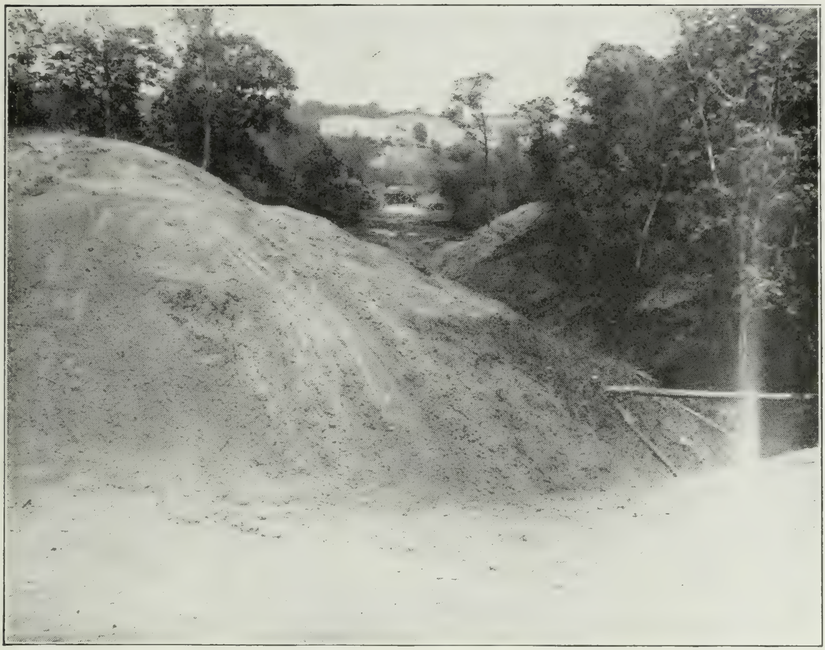


Figure 39.—Before Construction: Bond Route 16, Section 5A.

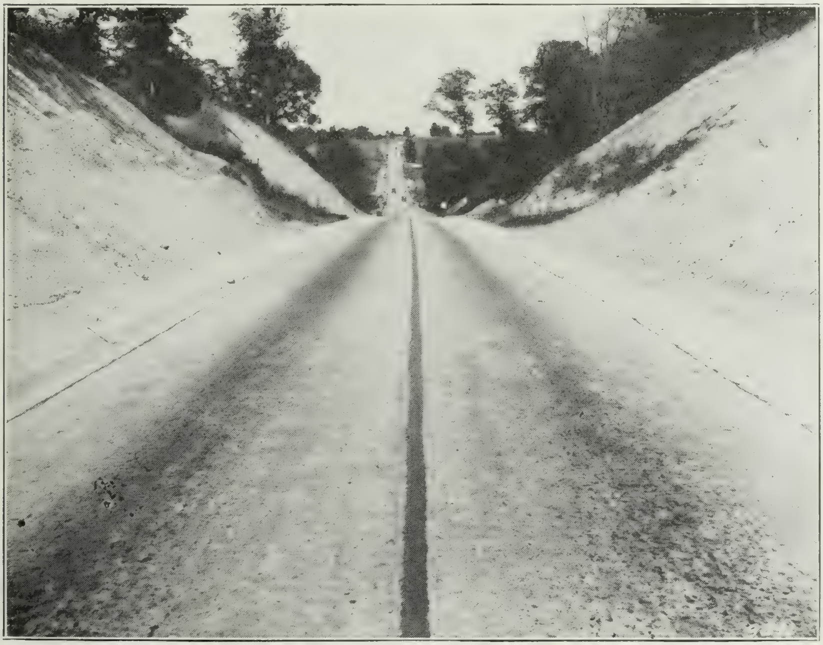


Figure 40.—After Construction: Bond Route 16, Section 5A.

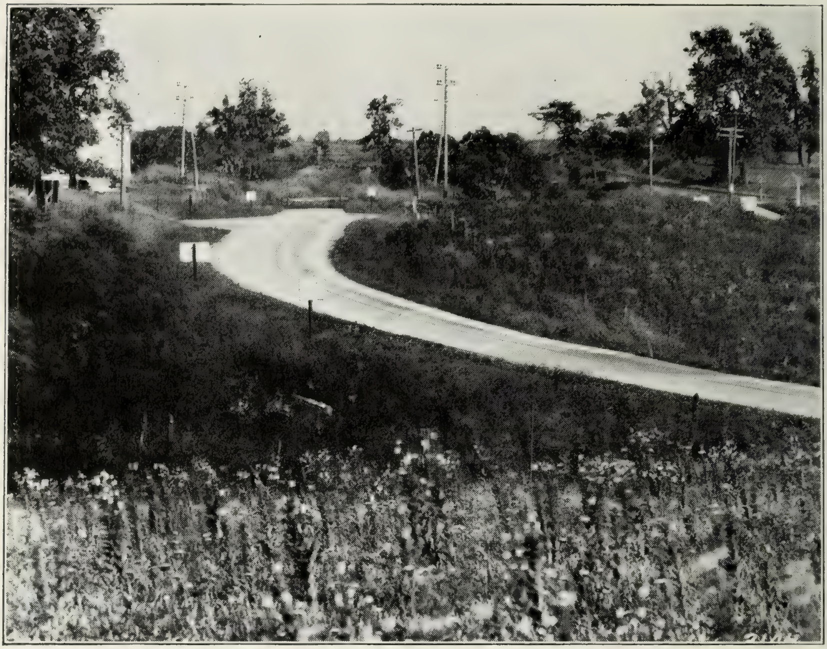


Figure 41.—Before Construction: Bond Route 3, Section 5.

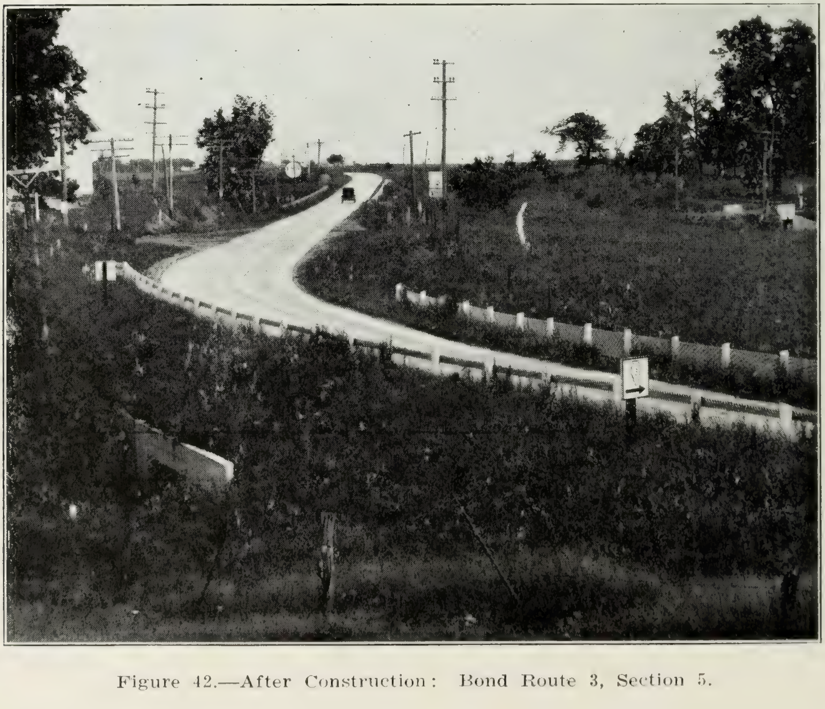


Figure 42.—After Construction: Bond Route 3, Section 5.

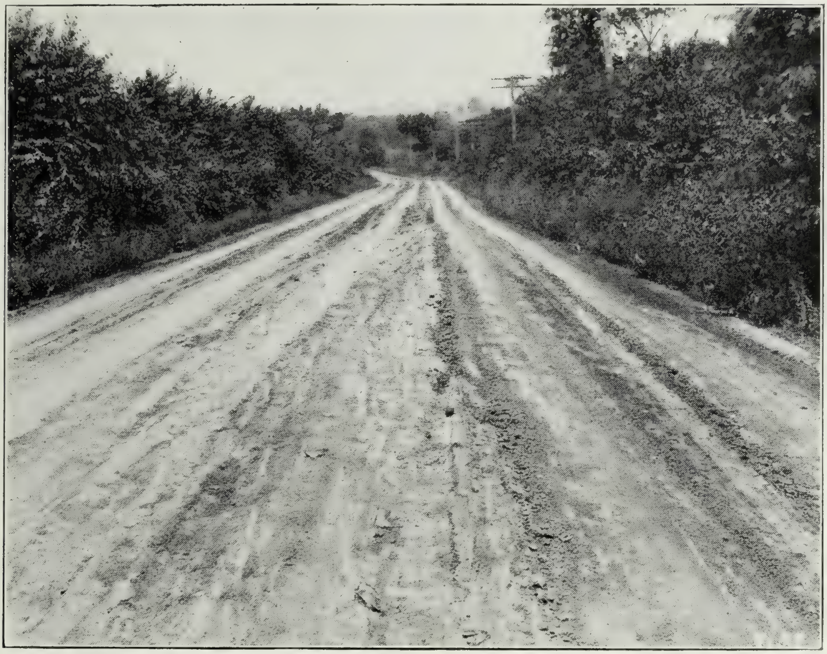


Figure 43.—Before Construction: Bond Route 24, Section 6, 8.

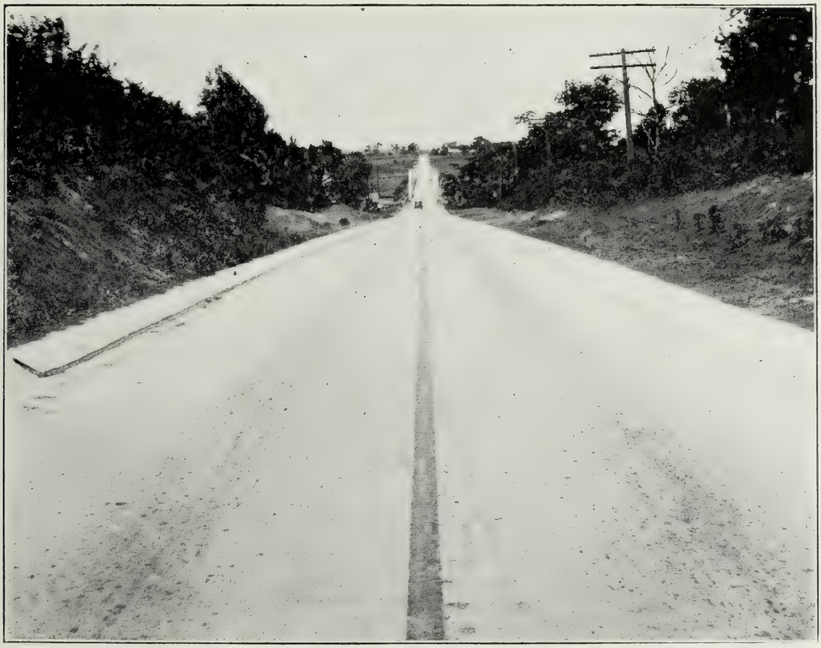


Figure 44.—After Construction: Bond Route 24, Section 6, 8.

IV. BUREAU OF MAINTENANCE.

1. GENERAL.—The maintenance of improved roads of the State, as well as the uncompleted bond issue routes and detours around construction, is supervised by the Bureau of Maintenance.

2. OUTLINE OF ACTIVITIES.—During the calendar year 1927, the Bureau of Maintenance maintained 5,897.48 miles of surfaced roads, consisting of the following:

Type.	Miles.	Percent.
Portland Cement Concrete	5,451.71	92.44
Bituminous Concrete	51.30	.87
Brick	165.49	2.81
Bituminous Macadam	25.85	.44
Water Bound Macadam	39.27	.66
Gravel	163.86	2.78
Total	5,897.48	100.00

The work of maintaining these types consists of repairing the pavement slab, filling ruts and eroded places in shoulders, cleaning culverts and ditches, cutting weeds and vegetation, cleaning and clearing the right of way, repairing and replacing signs, painting traffic line, repairing and replacing guard fence, repairing, cleaning and repainting of bridges, and the removal of snow.

The State also maintained 393.32 miles of detours, unpaved and temporary routes, consisting of the following types and mileages:

Type.	Miles.	Percent.
Earth	267.33	68.14
Gravel	86.41	22.03
Cinders	12.05	3.07
Macadam	13.24	3.38
Oiled Earth	......	......
Shale	4.02	1.02
Miscellaneous	9.27	2.36
	392.32	100.00

Numerous authorizations were granted during the year 1927 for the construction of additions and betterments, consisting of the erection of new safety signs and route markers, widening of curves, the construction of guard fence, curbs and gutters, new culverts, spillways, baffle walls, retaining walls and other items to the amount of $180,923.68.

3. PERMITS AND FRANCHISES.—Any property owner, corporation, public utility or other organization desiring to perform work of any nature within the limits of the right of way is required by law to obtain a permit for such work before it can be done. It is necessary that an investigation of all these cases be made to determine the advisability of issuing the permits. Before permits are issued, plans are required showing the location of the work. Where legal questions are involved, the matter is referred to the Attorney General's office for an opinion.

By means of these permits the Division of Highways can control the placing of such items within the right of way, and prevent the encroachment of private interests or corporations on State property, thereby preserving the highways for highway purposes.

During the year 1927, 2,471 permits were granted covering construction of entrances to private properties, gasoline filling stations, lunch stands, telephone and telegraph lines, electric power transmission lines, water mains, cable conduits and sewers.

4. FLOOD CONDITIONS ENCOUNTERED DURING 1927.—Unprecedented rains during the spring of 1927 did some damage to pavements and bridges, but considering the large mileage of paved roads in service, the damage was insignificant.

Several interesting conditions developed with relation to changes in stream channels at bridges caused by the high water. In some cases the high water had a tendency to change the stream channel, to cut back of the abutments, and to undermine piers. It became necessary in many cases to construct retards of brush or wire fencing, placed in such position as to cause the stream to gradually shift its channel toward bridge opening. These retards are inexpensive, easily constructed, and, when properly located, are very effective.

5. RIGHT OF WAY POSTS.—Because of the tendency of property owners to encroach on State right of way, the Department has adopted the policy of setting concrete right of way marker posts at the right of way line on all completed bond issue routes. Posts are made at the Chester Penitentiary without cost for labor, the State paying for the material. Approximately 20,000 posts were made in 1927.

6. ROUTE BULLETIN.—During 1927, the Bureau determined the length of all State Bond Issue Routes. This information was published in periodical route bulletins, issued from May to December. These bulletins give a detailed description of each route, distances, kinds and condition of pavements or road surfaces and in a general way indicate the population of towns and the location of tourists camps. This bulletin is furnished free to auto clubs, hotels, filling stations, garages and other places where it can be put into practical use.

7. COST ACCOUNTING.—During 1927 the Bureau of Maintenance issued 25,274 vouchers, involving a total expenditure of $2,890,251.55.

The work of perfecting the cost system which has been in use since 1924, has been continued with the result that it is now possible to make a very complete analysis of the cost of the various classes of work carried on, by types, years of construction, and by highway districts.

The following is a trial balance covering the transactions of the Bureau for the calendar year 1927:

TABLE XV—TRIAL BALANCE COVERING TRANSACTIONS OF THE BUREAU OF MAINTENANCE FOR THE CALENDAR YEAR 1927.

DEBITS.

Maintenance of Surfaced Roads—		
District No. 1 Patrol Costs	$476,254.10	
District No. 2 Patrol Costs	186,732.68	
District No. 3 Patrol Costs	237,232.62	
District No. 4 Patrol Costs	247,918.16	
District No. 5 Patrol Costs	254,057.93	
District No. 6 Patrol Costs	200,424.20	
District No. 7 Patrol Costs	169,294.95	
District No. 8 Patrol Costs	213,680.11	
District No. 9 Patrol Costs	147,140.53	
		$2,132,735.28
Maintenance of Detours—		
District No. 1 Patrol Costs	$31,145.95	
District No. 2 Patrol Costs	27,078.40	
District No. 3 Patrol Costs	34,670.90	
District No. 4 Patrol Costs	67,610.20	
District No. 5 Patrol Costs	10,762.09	
District No. 6 Patrol Costs	37,271.66	
District No. 7 Patrol Costs	20,953.07	
District No. 8 Patrol Costs	49,458.95	
District No. 9 Patrol Costs	56,513.53	
		335,464.75
Construction of Additions and Betterments—		
District No. 1 Section Costs	$25,906.44	
District No. 2 Section Costs	14,217.26	
District No. 3 Section Costs	17,949.45	
District No. 4 Section Costs	56,341.22	
District No. 5 Section Costs	24,092.25	
District No. 6 Section Costs	22,764.96	
District No. 7 Section Costs	7,449.71	
District No. 8 Section Costs	3,108.78	
District No. 9 Section Costs	9,093.61	
		180,923.68
Police Officers Costs		348,189.63
Police Officers Equipment		12,877.04
Maintenance, Machinery and Equipment		70,465.04
Sign and Post Shop Inventory		7,988.86
Maintenance Cash Refunds		44,202.92
Due from Counties for State Aid Maintenance		18,833.65
Total Debits		$3,151,680.85

CREDITS.

Highway Maintenance Road Fund Fifty-fourth General Assembly	$1,361,814.17
Highway Construction Road Fund Fifty-fourth General Assembly	39,900.97
Highway Construction Bond Fund Fifty-fourth General Assembly	36,970.57
Highway Maintenance Road Fund Fifty-fifth General Assembly	1,359,777.30
Highway Construction Road Fund Fifty-fifth General Assembly	33,200.90
Highway Construction Bond Fund Fifty-fifth General Assembly	58,587.64
County State Aid Maintenance Appropriations	55,258.44
Allowance for Depreciation	82,853.64
Bureau of Machinery	98,200.17
Bureau of Construction (Day Labor)	2,837.38
Bureau of Materials	22,279.67
	$3,151,680.85

The following graphic chart (Figure 45) shows the total cost of operation of the Bureau of Maintenance for the calendar year 1927 according to the activities carried on during the year:

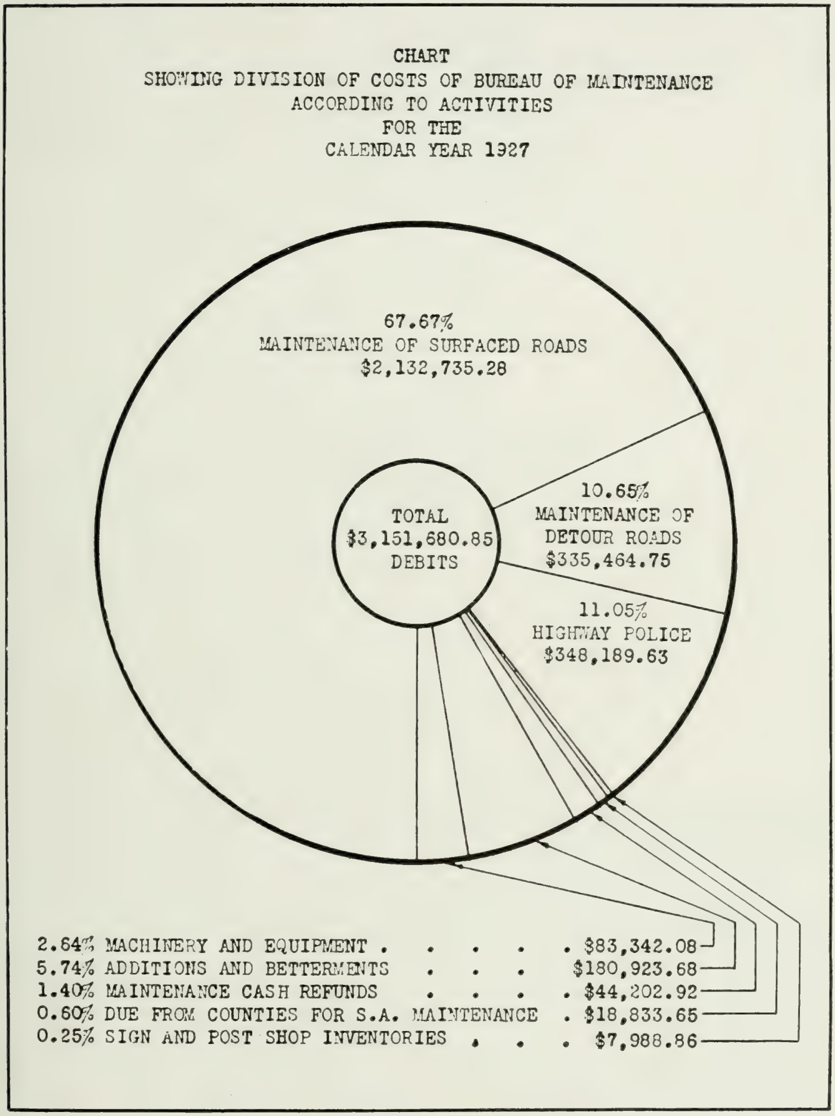


Figure 45.

The following graph (Figure 46) shows the sources from which funds were derived for carrying on the activities of the Bureau of Maintenance for the calendar year 1927:

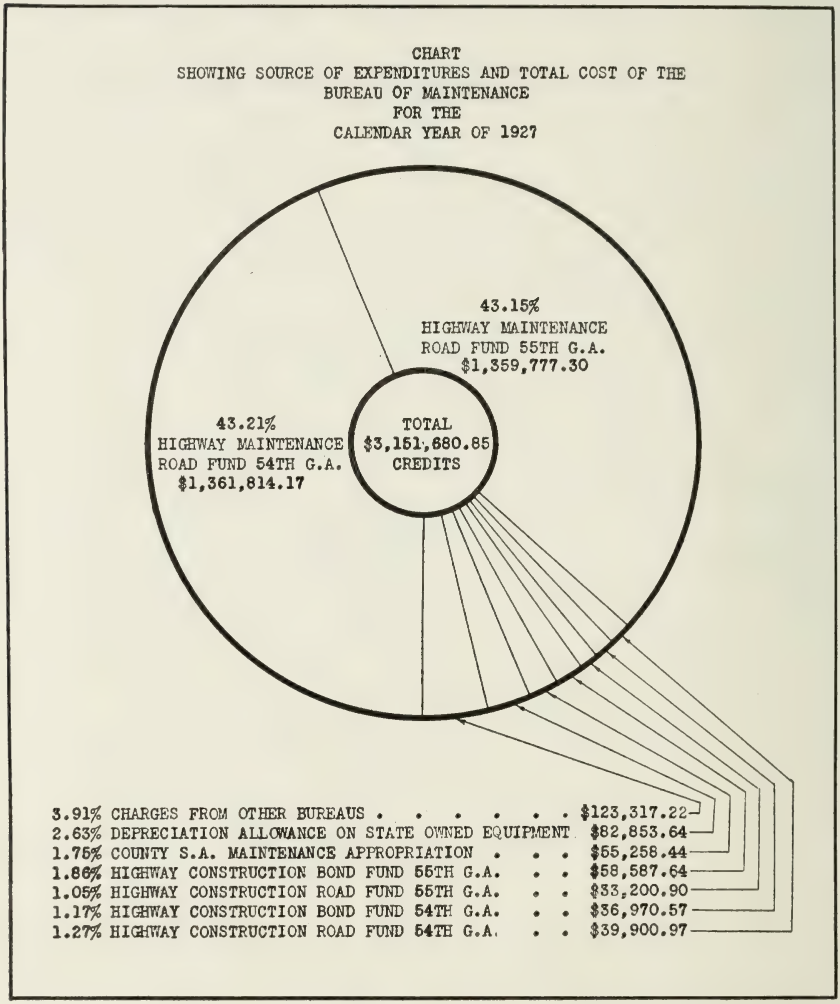


Figure 46.

The following graph (Figure 47) shows the division of mileage of surfaced roads maintained for the calendar year 1927:

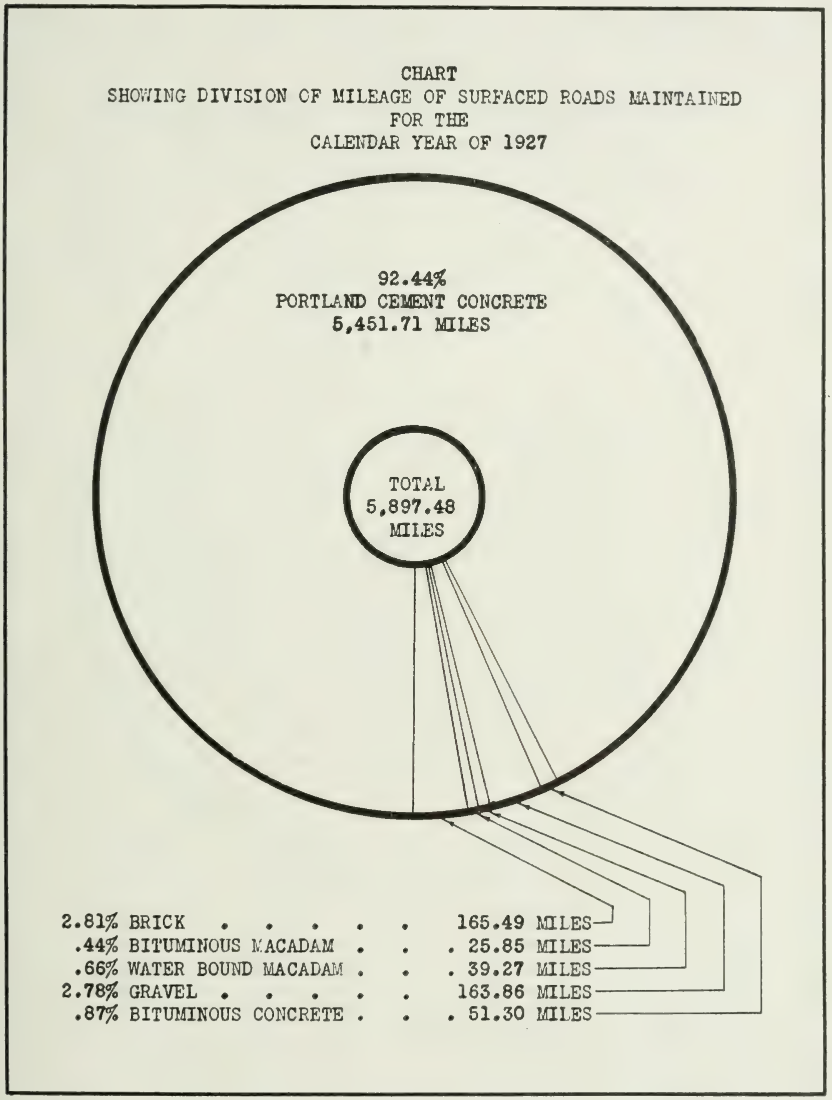


Figure 47.

The following graph (Figure 48) shows the costs of the Bureau of Maintenance by classification of work on surfaced roads for the calendar year 1927:

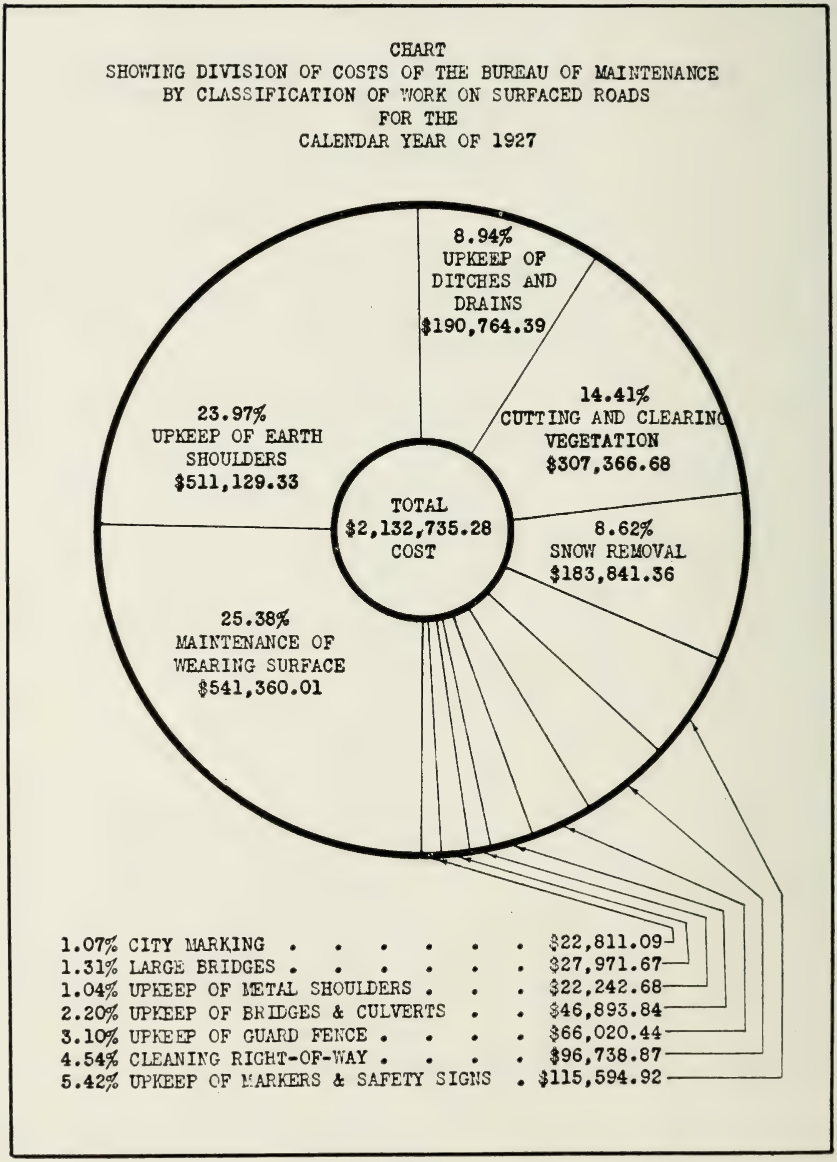


Figure 48.

The following graph (Figure 49) shows the division of costs of the Bureau of Maintenance on surfaced roads by cost components for the calendar year 1927:

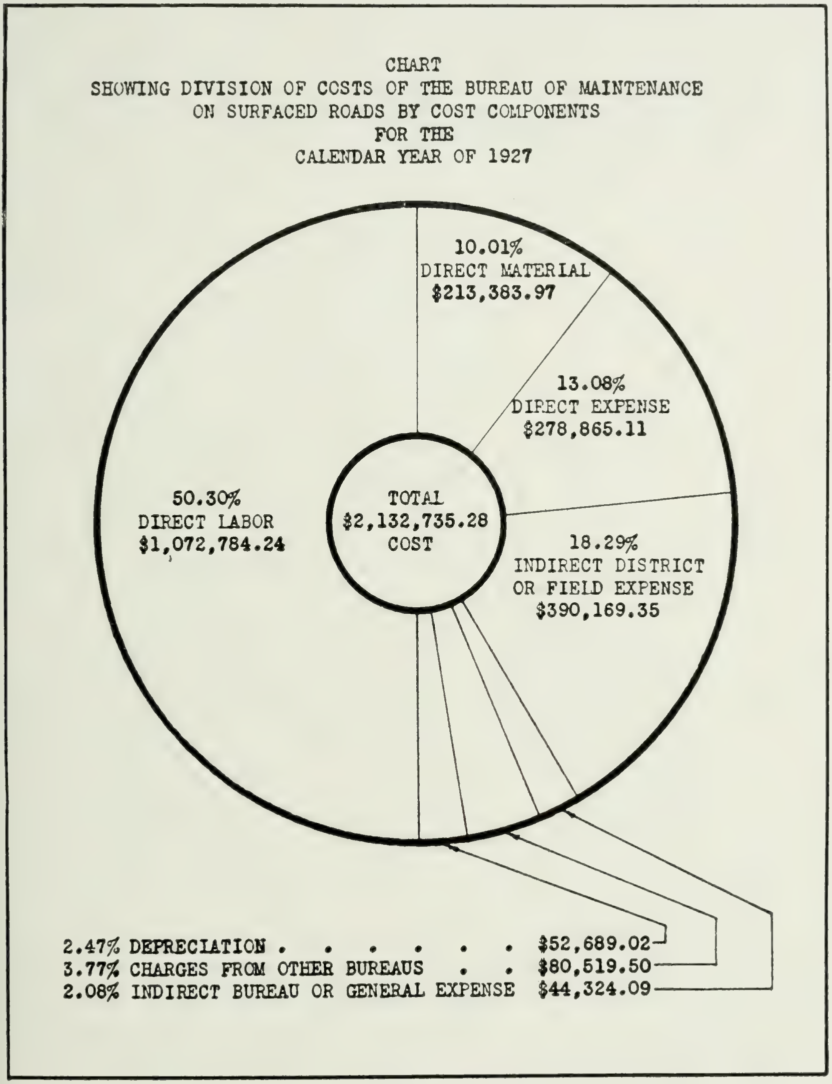


Figure 49.

The following graph (Figure 50) shows the division of costs of the Bureau of Maintenance by classification of work on 5,451.71 miles of Portland cement concrete roads for the calendar year 1927:

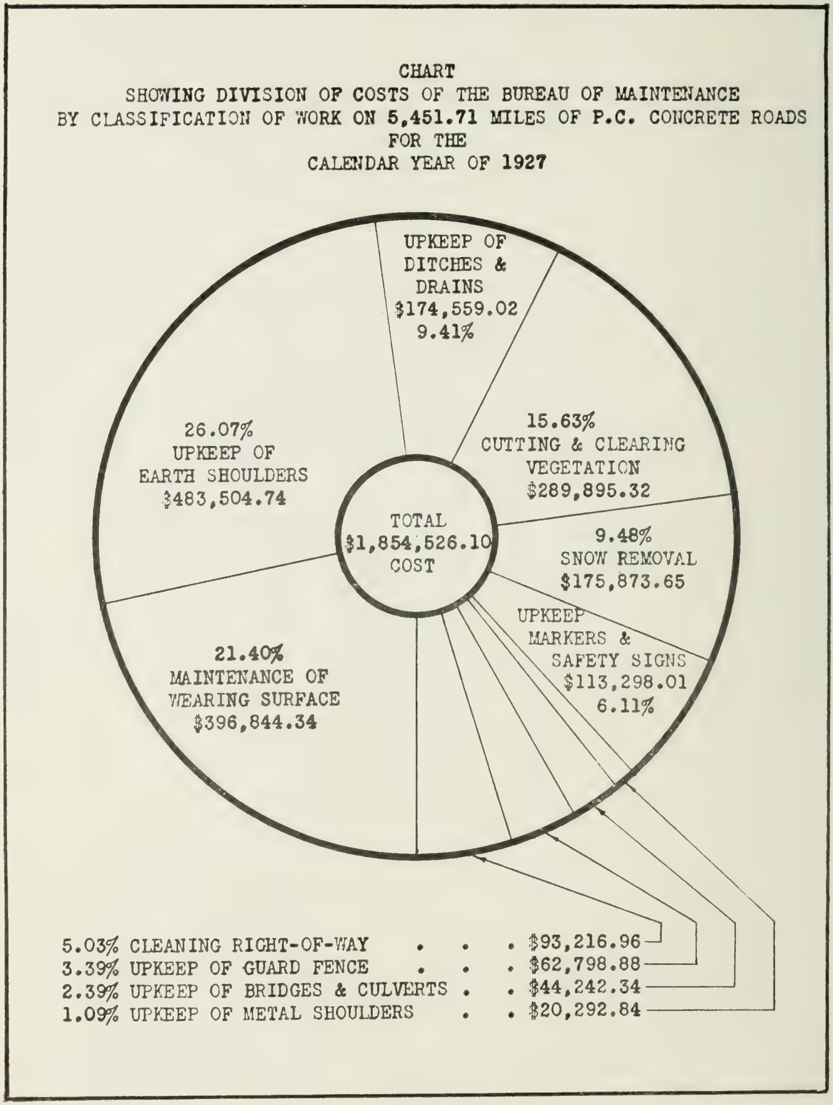


Figure 50.

The following graph (Figure 51) shows the division of costs of the Bureau of Maintenance by classification of work on 165.49 miles of brick roads for the calendar year 1927:

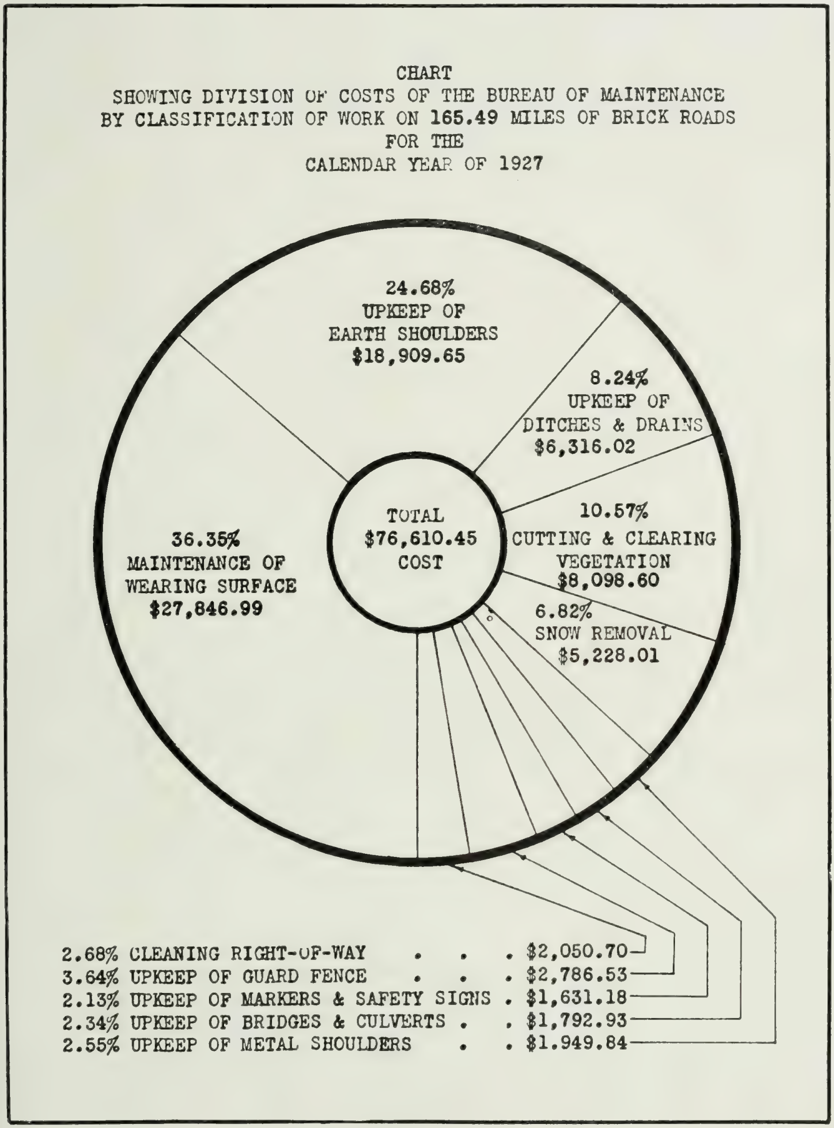


Figure 51.

The following graph (Figure 52) shows the division of mileage of detour roads maintained for the calendar year 1927:

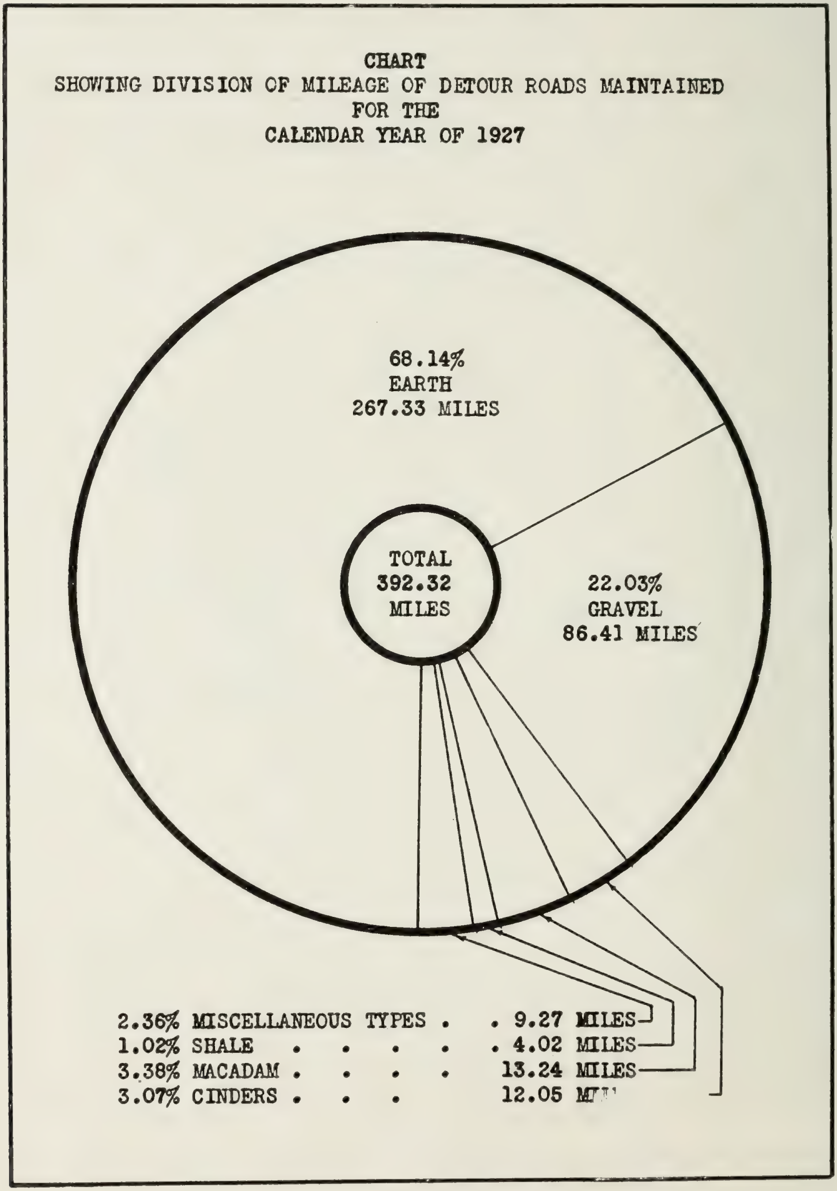


Figure 52.

The following graph (Figure 53) shows the division of costs of maintaining detours, unpaved and temporary routes for the calendar year 1927:

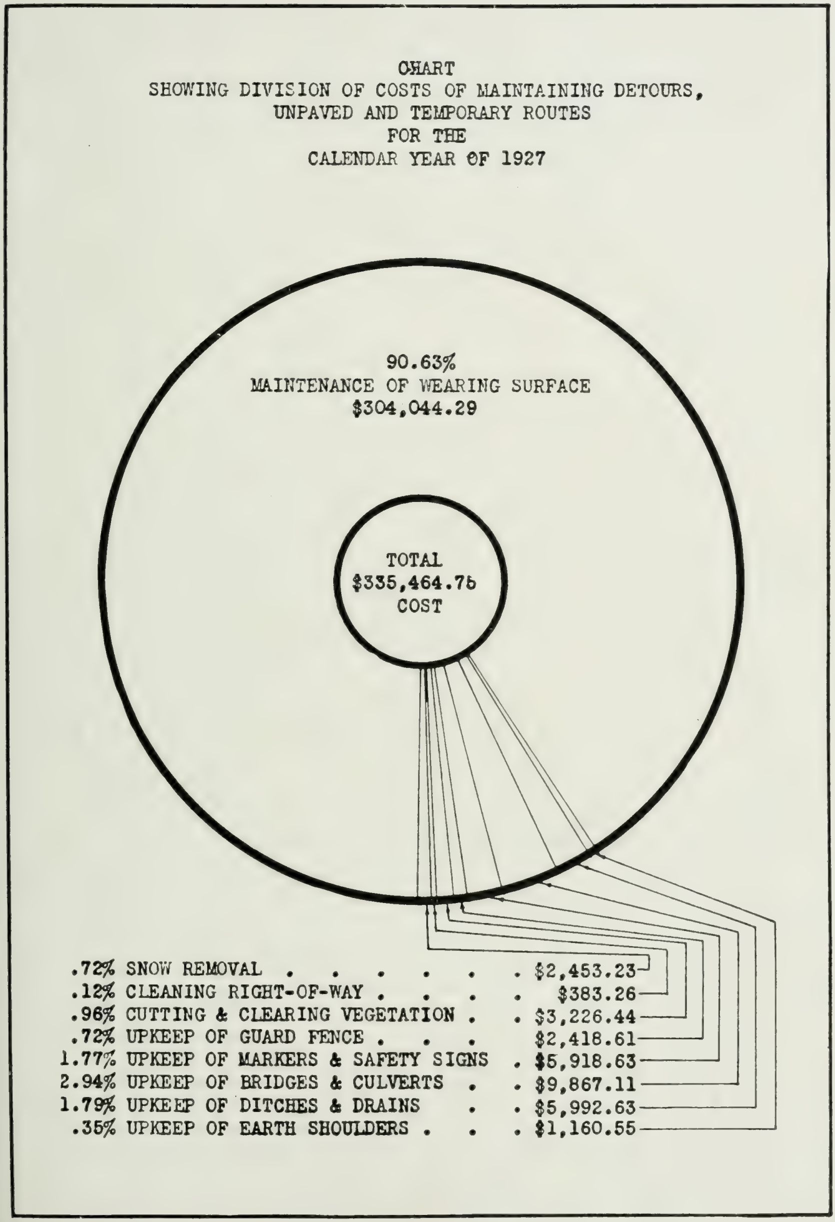


Figure 53.

The following graph (Figure 54) shows the division of costs of the Bureau of Maintenance on detours, unpaved and temporary routes by cost components for the calendar year 1927:

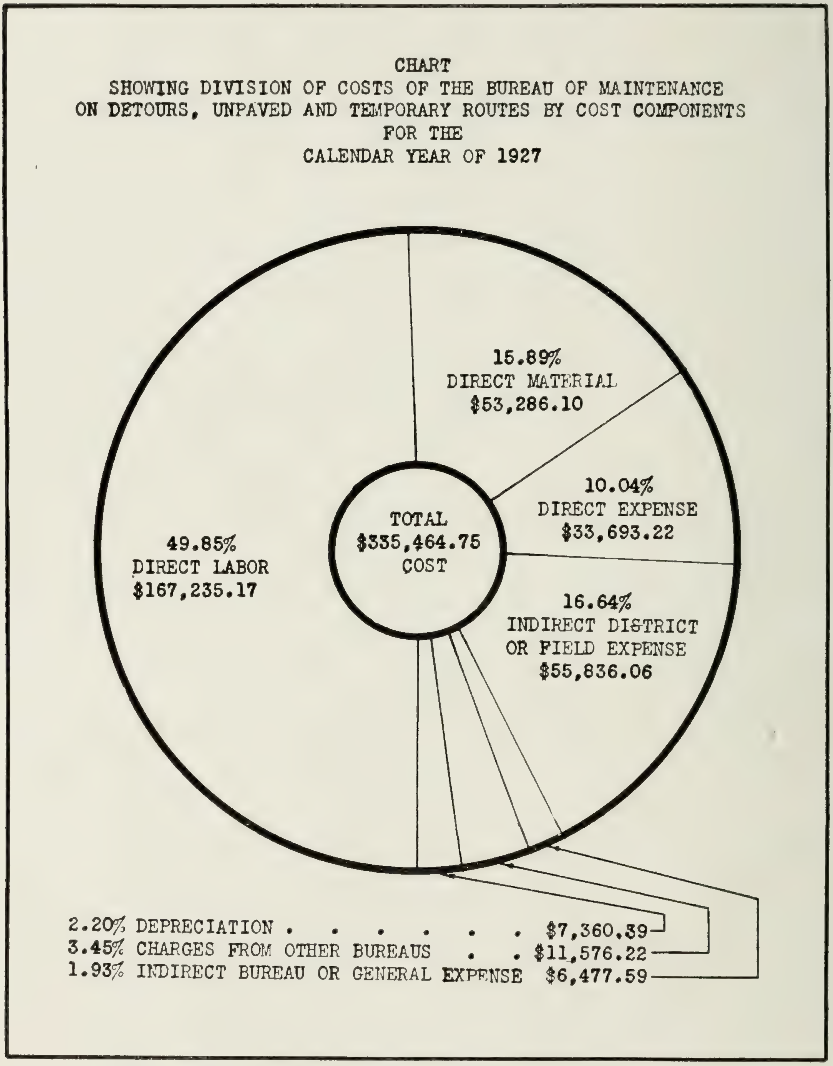


Figure 54.

8. SNOW REMOVAL.—The policy of the Department of keeping the main trunk highways of the State free from snow and open to traffic was maintained during 1927.

The snowfall of January 12th and 13th was the only heavy snow encountered during the season. Traffic was blocked on many of the routes in the northern part of the State for a short period only. In all cases all routes were open in less than seventy-two hours time. High winds caused considerable drifting.

In addition to equipment bought last year, the Department purchased approximately $31,500 worth of additional equipment, which consisted mostly of V-type snow plows.

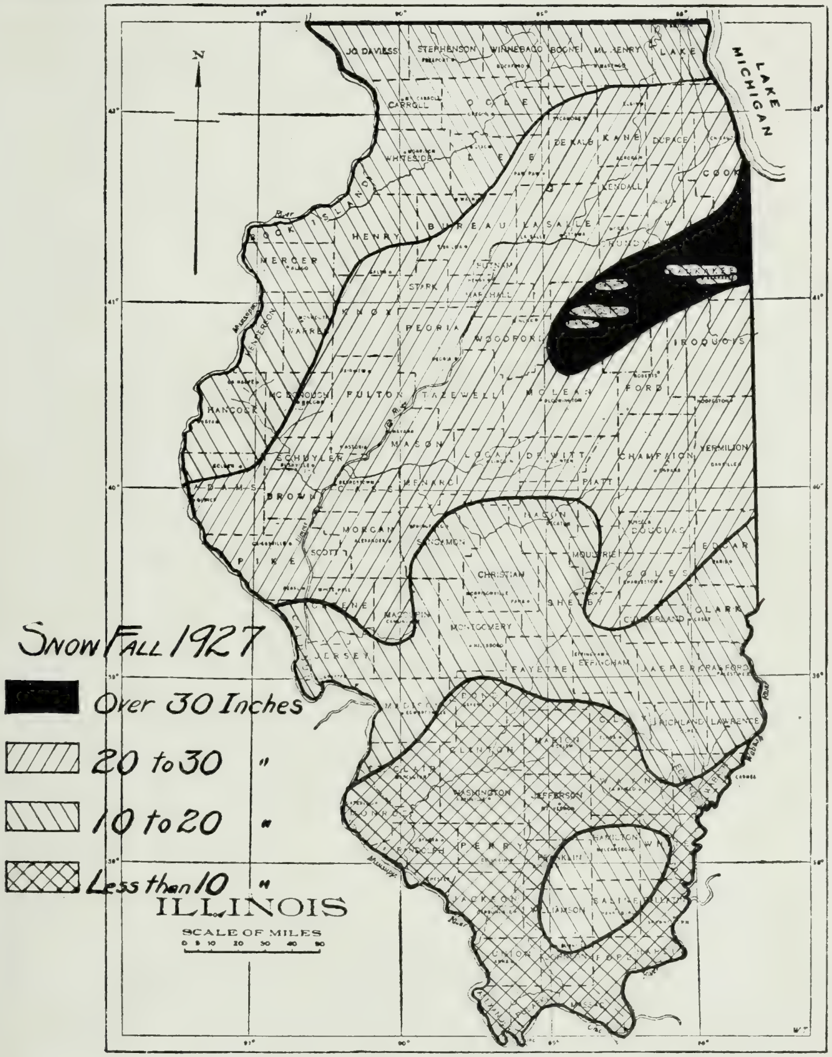


Figure 55.—Map showing the depth of snowfall by sections for the calendar year 1927.

Figure 55 shows the depth of snowfall by sections for the calendar year 1927.

Table XVI shows the cost of snow removal by districts for the entire State.

TABLE XVI—STATEMENT SHOWING COST OF SNOW REMOVAL FOR THE NORTHERN, CENTRAL AND SOUTHERN ZONES FOR THE CALENDAR YEAR 1927.

District number.	Weighted average mileage.	Labor hours.	Direct labor.	Direct expense.	Direct total cost.	Overhead expense.	Total cost.	Average cost per mile.
No. 1	568.17	40,562½	$24,025.13	$8,232.21	$32,257.34	$13,210.23	$45,467.57	$ 80.02
No. 2	342.69	13,760	6,987.46	2,028.81	9,016.27	5,066.75	14,083.02	41.10
No. 3	376.16	16,062½	10,450.94	4,765.35	15,216.29	12,728.27	27,944.56	74.29
No. 4	301.78	29,280	15,579.70	8,981.93	24,561.63	9,788.42	34,350.05	113.83
Total for Northern District	1,588.80	99,665	$57,043.23	$24,008.30	$81,051.53	$40,793.67	$121,845.20	$76.69
No. 5	354.98	22,502	$13,289.48	$5,761.46	$19,050.94	$11,531.23	$30,582.17	$86.15
No. 6	248.51	8,408	5,375.04	3,087.69	8,462.73	3,469.66	11,932.39	48.01
Total for Central District	603.49	30,910	$18,664.52	$8,849.15	$27,513.67	$15,000.89	$42,514.56	$70.45
No. 7	163.70	7,557	$3,997.68	$1,168.16	$5,165.84	$2,066.94	$7,232.78	$44.19
No. 8	220.23	9,242	4,307.42	2,374.62	6,682.04	2,214.38	8,896.42	40.39
No. 9	116.53	3,030	1,543.87	985.84	2,529.71	1,178.97	3,708.68	31.83
Total for Southern District	500.46	19,829	$9,848.97	$4,528.62	$14,377.59	$5,460.29	$19,837.88	$39.64
Total for entire State	2,692.75	150,404	$85,556.72	$37,386.07	$122,942.79	$61,254.85	$184,197.64	$68.41

9. MAINTENANCE OF SURFACED ROADS.—*a. Organization.* Surfaced roads are arranged by types and the year constructed and divided into patrols. The patrols are grouped as maintenance sections averaging about nineteen miles in length which is a convenient mileage for one patrolman.

A number of maintenance sections, usually about six or eight in number, are in charge of a supervising patrolman responsible to the District Maintenance Engineer. The District Maintenance Engineer is in general charge of all maintenance work in the district, and is responsible to the District Engineer who in turn reports to the Engineer of Maintenance.

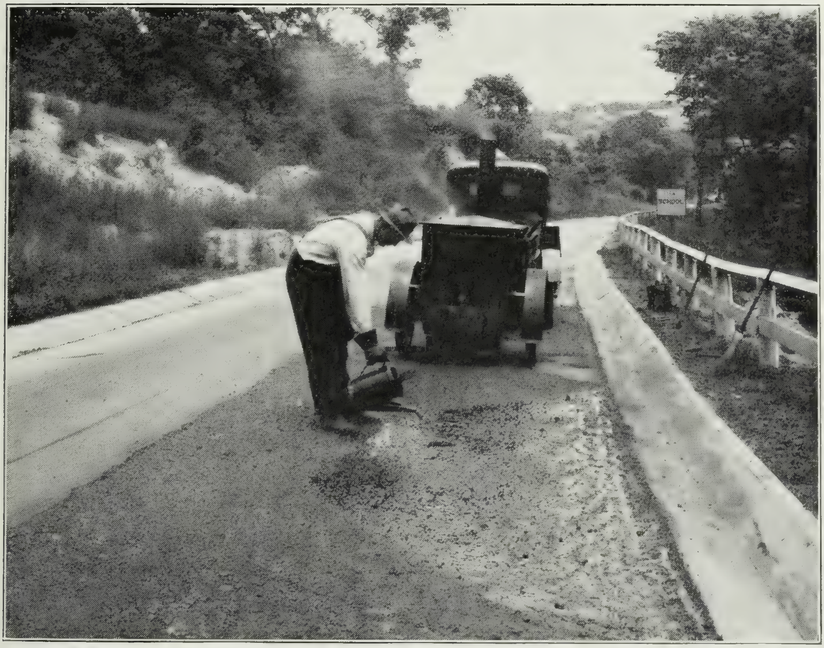


Figure 56.—Maintenance crew blacktopping low spot in pavement.

b. Equipment.—Each patrolman is equipped with a truck, tar kettle, grader, and such other small tools as may be necessary. He is held responsible for the keeping of his equipment in serviceable condition, and is required to report the condition of same periodically to his supervising patrolman.

c. Methods.—Where narrow cracks and breaks have developed in concrete pavement, they are generally repaired with asphalt, sand and gravel. Large cracks are repaired with concrete. Depressions are either built up with asphalt, gravel, stone or chips, or the pavement is removed entirely and replaced with new construction.

Ruts in the shoulders are usually filled with earth and dragged smooth. In the case of some of the heavier traveled roads, where ex-

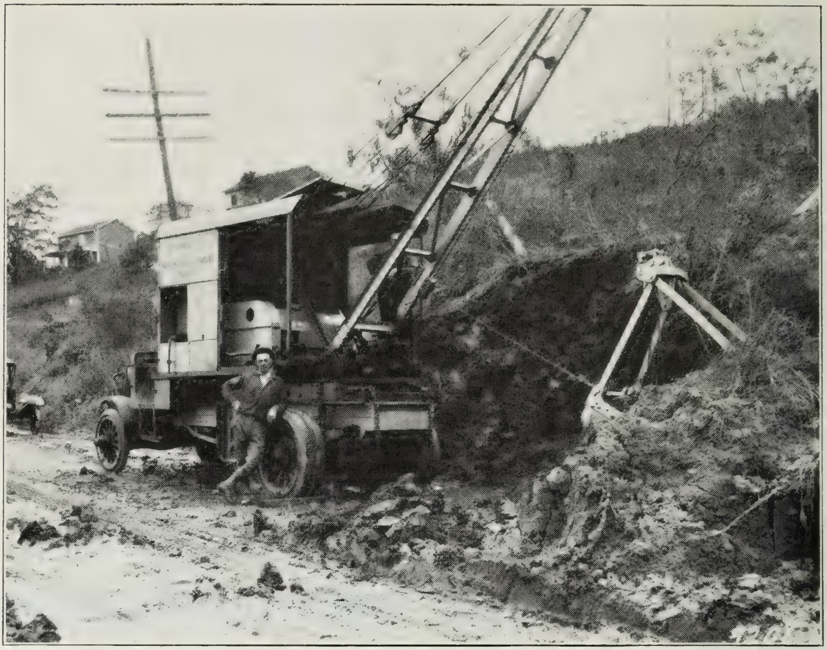


Figure 57.—A portable crane operated by maintenance crew.

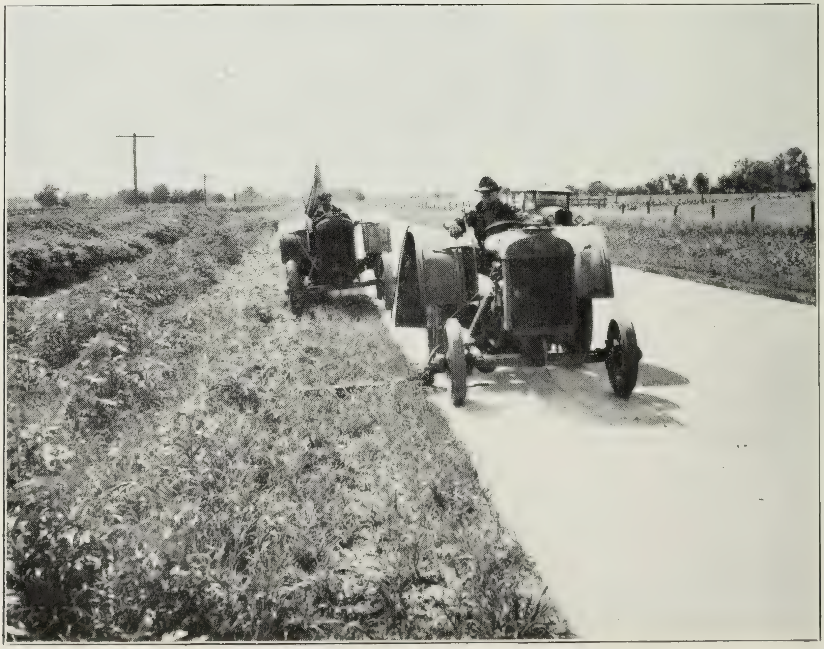


Figure 58.—Maintenance crew mowing shoulders.

cessive rutting has developed, gravel, shale or crushed rock is placed along the edges of the pavement. Ditches and culverts are cleaned systematically to provide the necessary drainage. Weeds are cut and the shoulders mowed during the summer and fall seasons. Objectionable growths are either removed or trimmed.

d. Traffic Line Marking. For the purpose of guiding traffic and protecting the center construction joint, an asphalt traffic line is applied to the center of the pavement. This line is painted by machine, which has been developed and constructed by the Bureau of Maintenance. An average day's work for one of these marking machines is approximately twenty miles.

Figure 59 shows traffic line machine.

Figure 60 shows center line made with machine.

e. Route Markers and Safety Signs.—The type of route marker and safety sign which is used in Illinois in marking the highways complies with the regulations adopted by the Bureau of Public Roads and the American Association of State Highway Officials for the uniform marking of the principal highways of the United States.

All routes on the State Bond Issue system have been plainly marked with the route number placed within an outline map of the State of Illinois. Figure 61 shows the type of route marker used along the routes.

Telephone poles have also been marked along the routes at frequent intervals as an aid and guide to the public. Figure 62 shows the type of telephone pole marking.

Routes through cities and villages have been marked with signs placed at convenient points inside the city limits indicating the direction and distance of prominent towns along such routes. Figure 63 shows the type of direction sign used inside of cities. Figure 64 shows a type of stop sign used in marking streets and roads intersecting State highways.

At the city limits of each town the markers erected indicate the names of principal cities and towns along the route and mileage thereto. Figue 65 shows one of these markers.

At the city limits of each city or town a marker is erected showing the name of the city or town and its population. Figure 66 shows one of these markers.

At the junction of all State routes, markers have been erected showing the number of intersecting routes as well as markers indicating the names of principal towns and mileages along each route. Figure 67 shows the type of junction sign used.

Warning signs have also been erected at necessary points along the route to warn the public of potential danger. These signs have been erected at a sufficient distance from the point of danger to warn the drivers to check the speed of their cars before reaching the indicated point. The square or rectangular sign indicates a minimum degree of danger, the diamond shape sign indicates caution or an intermediate

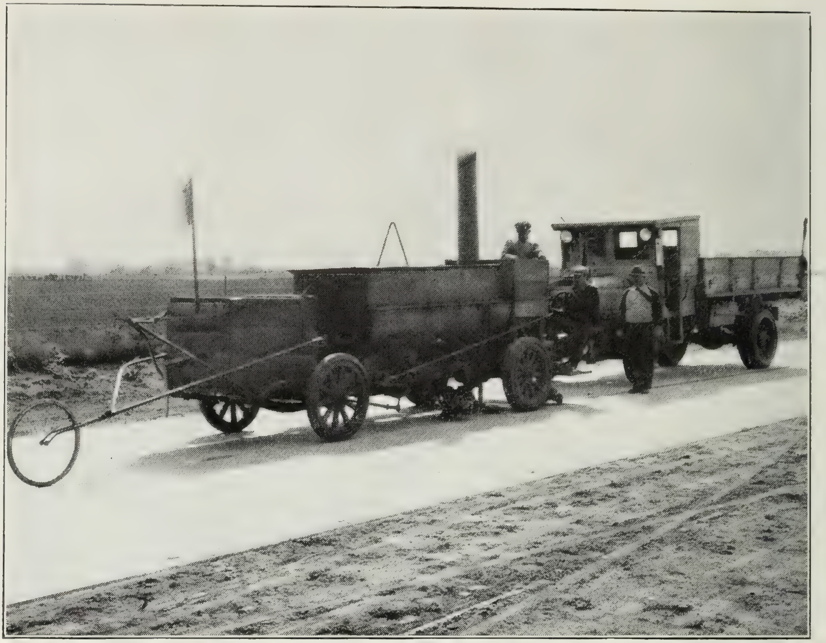


Figure 59.—Traffic line machine.

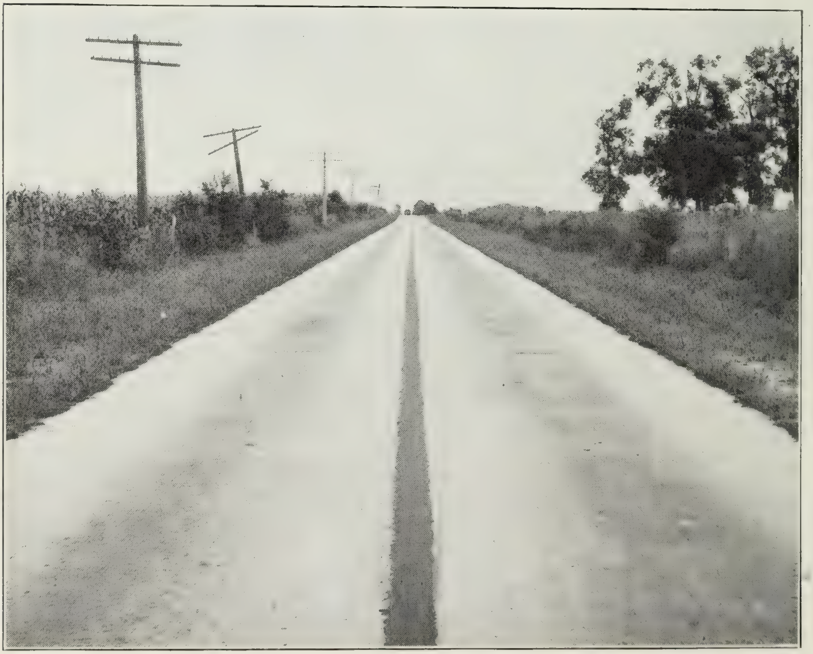


Figure 60.—View of State road showing center line made with traffic line machine.

degree of danger, and the octagonal sign indicates danger of a maximum degree. Figures 68, 69 and 70 show the type of signs used at these various points.

All approaches to railroad crossings are marked by a round sign with black cross bars and by diagonal black and white stripes painted on the pavement at intervals of one hundreed feet, the first being a distance of four hundred feet from the nearest rail. Figure 71 shows the two types of warning markers used at grade crossings.

f. Government Marking.—Since the appointment of a Joint Board on Interstate Highways in 1925 by the Secretary of Agriculture to select and designate a system of through interstate routes and to devise a uniform scheme for designating such routes in such a manner as to give them a conspicuous place among the highways of the country as roads of interstate and national importance, a committee composed of members of the Bureau of Public Roads and the American Association of State Highway Officials, was selected to work out a system known as Federal highways. Illinois was represented on this committee by the Chief Highway Engineer. These Federal routes through the State of Illinois have been marked with a shield bearing the State name and the U. S. route numbers. This shield is painted white with the border, figures and letters painted in black.

Figure 72 shows M-3, the Government shield which is for general use.

Figure 73 shows M-23, the Government marker which is used inside of cities only.

Figue 74 shows D-4, junction signs placed on the route at junction points.

The following chart (Figure 75) shows the location of the Federal routes through the State:

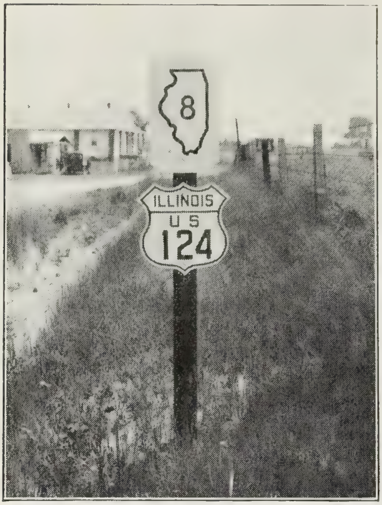


Figure 61.

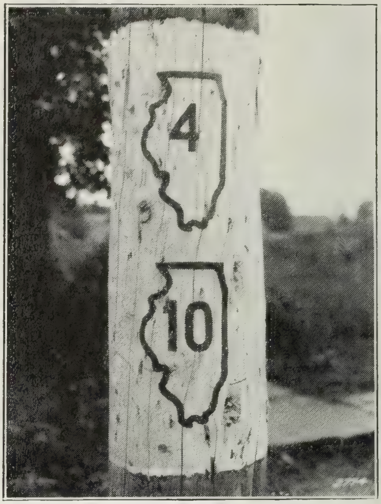


Figure 62.

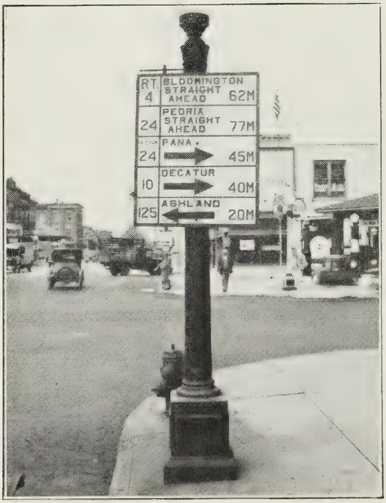


Figure 63.

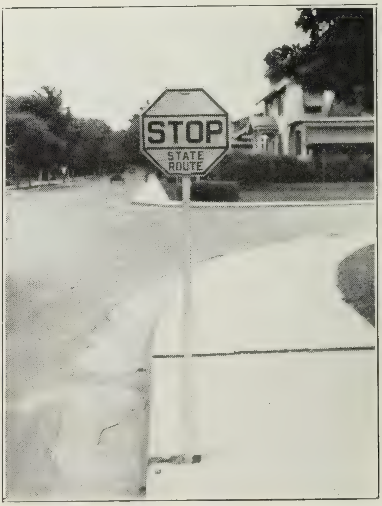


Figure 64.

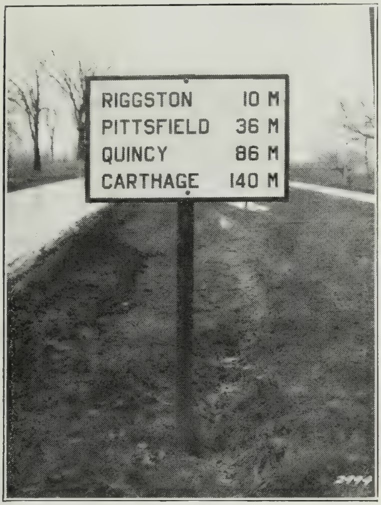


Figure 65.

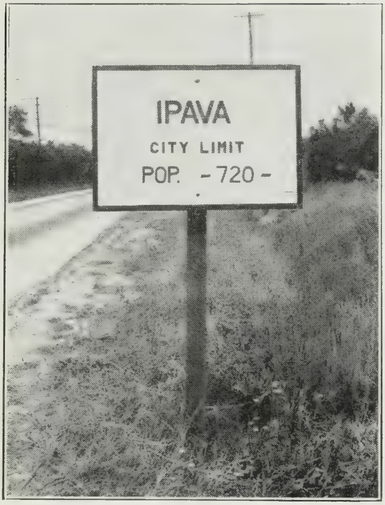


Figure 66.

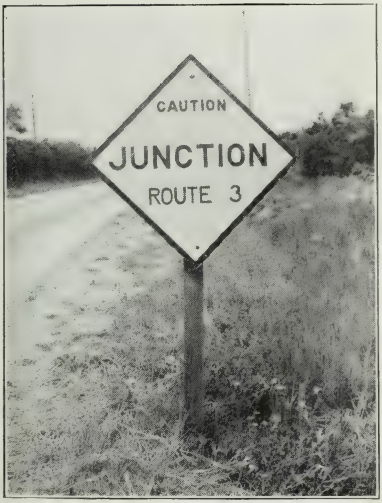


Figure 67.

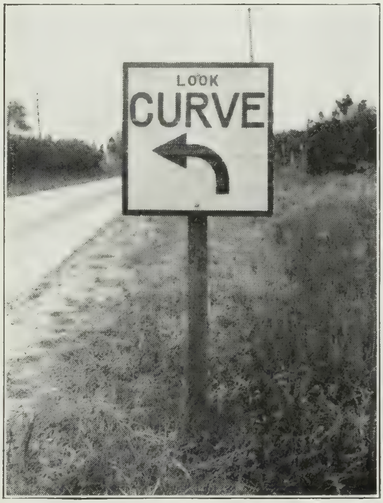


Figure 68.

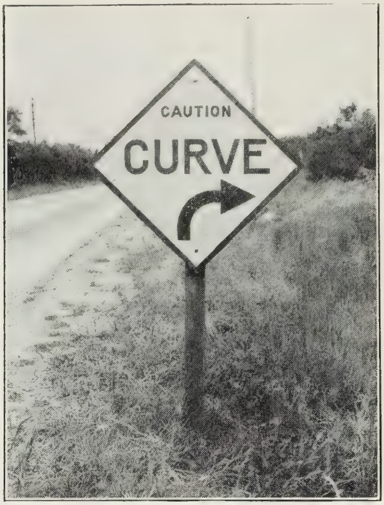


Figure 69.

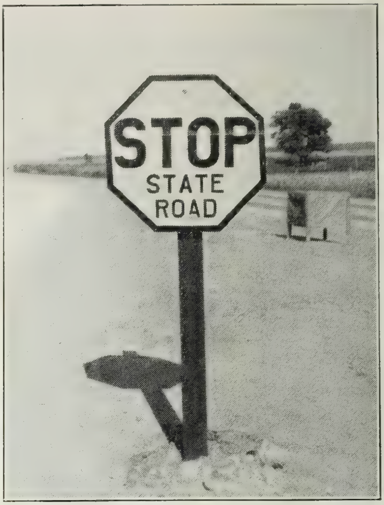


Figure 70.

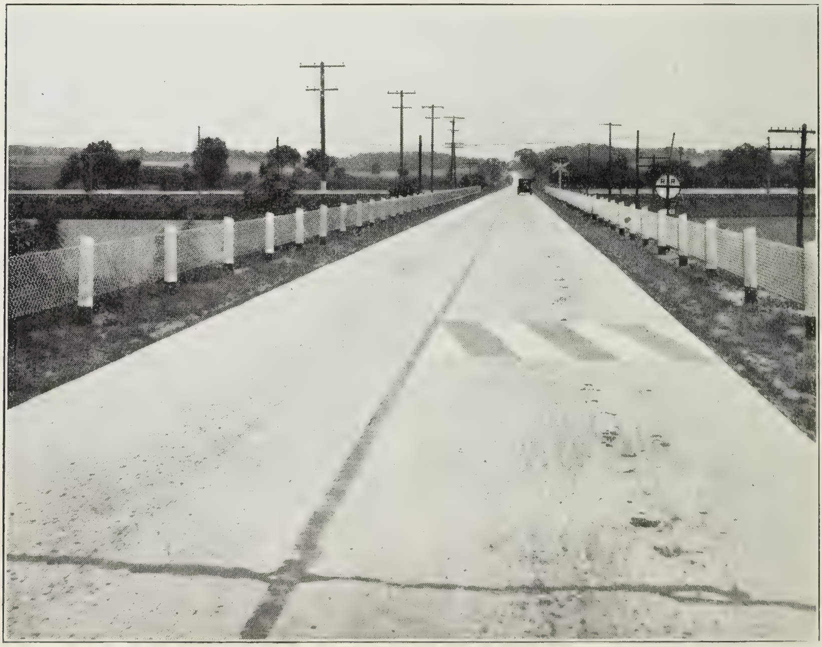


Figure 71.

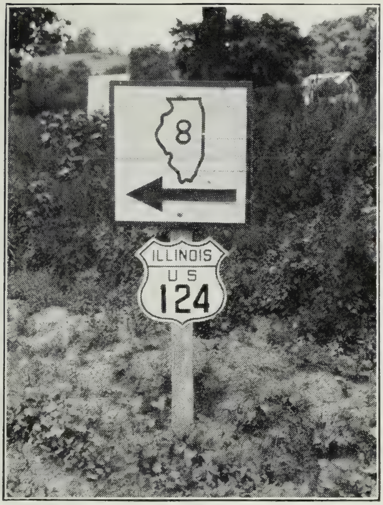


Figure 72.

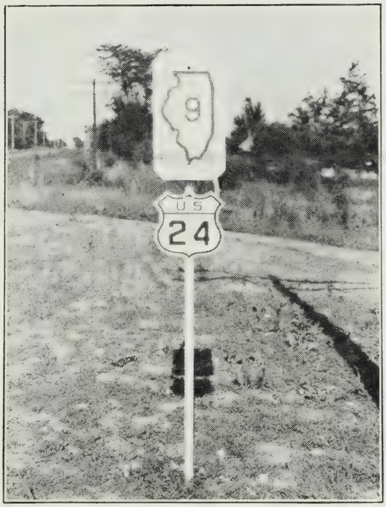


Figure 73.

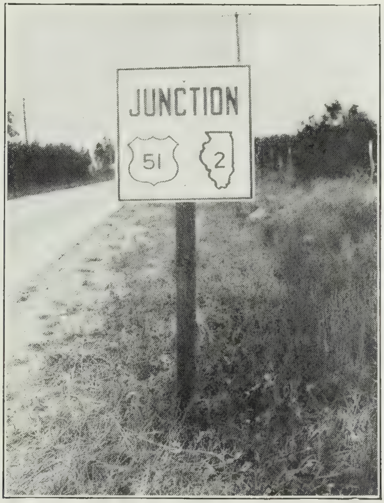


Figure 74.

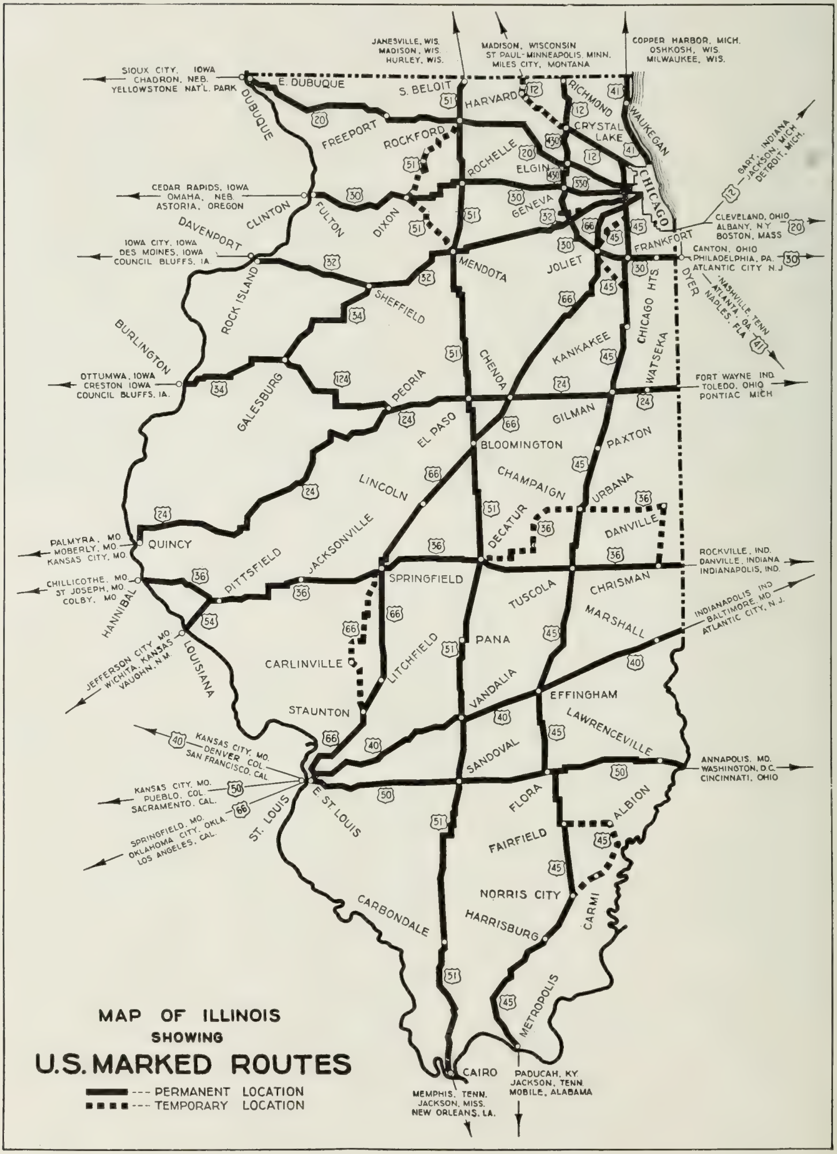


Figure 75.—Map showing location of Federal routes through Illinois.

TABLE XVII—STATEMENT SHOWING COST OF MARKING ROUTES THROUGH CITIES IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

District.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.
No. 1	15,007	$8,376.98	$257.53	$1,350.74	$9,985.25	$4,156.68	$14,141.93
No. 2	899	477.74	81.22	93.60	652.56	215.15	867.71
No. 3	1,987	928.45	335.50	85.59	1,349.54	988.89	2,338.43
No. 4	2,749½	1,237.98	18.10	161.02	1,417.10	622.19	2,039.29
No. 5	1,618	713.15			713.15	451.94	1,165.09
No. 6	1,244	603.70			603.70	326.55	930.25
No. 7	255	126.40	2.20		128.60	56.33	184.93
No. 8	1,301	646.37		1.50	647.87	224.61	872.48
No. 9	369	184.50	13.08	3.00	200.58	70.40	270.98
Total	25,429½	$13,295.27	$707.63	$1,695.45	$15,698.35	$7,112.74	$22,811.09

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

Table XVIII shows a comparison of mileages and costs on a per mile basis arranged by types and costs units for the calendar year 1927 for all classes of surfaced roads.

TABLE XVIII—STATEMENT SHOWING COMPARISON OF MILEAGES AND COSTS ON PER MILE BASIS BY TYPES AND UNITS FOR THE CALENDAR YEAR 1927.

	Portland cement concrete.	Brick.	Bituminous concrete.	Bituminous macadam.	Waterbound macadam.	Gravel.
Miles maintained	5,451.71	165.49	51.30	25.85	39.27	163.86
Maintenance of Wearing Surface—						
Paved surface	$72.79	$168.27	$511.44	$201.63	$1,039.05	$271.06
Upkeep of Roadside—						
Metal shoulders	$ 3.72	$ 11.78	—	—	—	—
Earth shoulders	88.68	114.26	$38.12	$123.11	$72.69	$ 4.41
Ditches and drains	32.02	38.17	8.44	17.46	81.53	35.42
Bridges and culverts	8.12	10.84	1.90	1.38	1.78	4.00
Markers and safety signs	20.78	9.86	10.03	2.56	—	.52
Guard fence	11.52	16.84	6.15	1.33	—	.52
Cutting and clearing vegetation	53.17	48.92	50.78	37.48	29.74	28.27
Cleaning traveled way	17.11	12.39	12.18	3.34	2.99	3.92
Snow removal	32.26	31.60	16.72	20.69	13.77	4.92
Total upkeep	$267.38	$294.66	$144.32	$207.35	$202.50	$81.98
Total maintenance and upkeep	$340.17	$462.93	$655.76	$408.98	$1,241.55	$353.04

NOTE.—The costs per mile shown under bituminous macadam and gravel do not represent a fair average cost for maintenance and upkeep of such types due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition. The high cost shown under waterbound macadam was used by the resurfacing of 13.26 miles of old macadam roads.

Table XIX shows a comparison of the costs of maintaining the various types of surfaced roads during the calendar year 1927.

TABLE XIX—STATEMENT SHOWING COMPARISON OF MILES AND COSTS OF VARIOUS TYPES MAINTAINED DURING THE CALENDAR YEAR 1927.

	Portland cement concrete.	Brick.	Bituminous concrete.	Bituminous macadam.	Waterbound macadam.	Gravel.	Total.
Miles maintained	5,451.71	165.49	51.30	25.85	39.27	163.86	5,897.48
Maintenance of Wearing Surface— Paved surface	$396,844.34	$27,846.99	$26,236.74	$5,211.89	$40,803.25	$44,416.80	$541,360.01
Upkeep of Roadside—							
Metal shoulders	$ 20,292.84	$ 1,949.84	----	----	----	----	$ 22,242.68
Earth shoulders	483,504.74	18,909.65	$1,955.48	$3,182.28	$2,854.45	$ 722.73	511,129.33
Ditches and drains	174,559.02	6,316.02	433.38	451.38	3,201.84	5,802.75	190,764.39
Bridges and culverts	44,242.34	1,792.93	97.31	35.90	69.74	655.62	46,893.84
Markers and safety signs	113,298.01	1,631.18	514.55	66.13	----	85.05	115,594.92
Guard fence	62,798.88	2,786.53	315.81	34.35	----	84.87	66,020.44
Cutting and clearing vegetation	289,895.32	8,098.60	2,604.33	968.80	1,167.82	4,631.81	307,366.68
Cleaning traveled way	93,216.96	2,050.70	624.87	86.27	117.43	642.64	96,738.87
Snow removal	175,873.65	5,228.01	857.91	534.98	540.99	805.82	183,841.36
Total upkeep	$1,457,681.76	$48,763.46	$7,403.64	$5,360.09	$7,952.27	$13,431.29	$1,540,592.51
Total maintenance and upkeep cost	$1,854,526.10	$76,610.45	$33,640.38	$10,571.98	$48,755.52	$57,848.09	$2,081,952.52

Table XX shows the number of patrols and various types of surfaced roads located in the various districts of the State.

TABLE XX—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF SURFACED ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1927 IN ALL DISTRICTS.

District.	Portland cement concrete.		Brick.		Bituminous concrete.		Bituminous macadam.		Waterbound macadam.		Gravel.		Patrols, consisting of bridges—100 foot span or over.	Total.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.		Patrols.	Miles.
No. 1	176	991.57	3	2.42	16	51.30	2	9.15	8	19.16	3	4.58	53	261	1,078.18
No. 2	65	539.02	5	11.98	--------	--------	4	7.61	3	4.28	13	67.87	26	116	630.76
No. 3	94	783.69	9	6.88	--------	--------	2	1.79	1	2.00	7	31.56	25	138	825.92
No. 4	91	594.46	8	17.10	--------	--------	--------	--------	--------	--------	1	.51	18	118	612.07
No. 5	84	761.73	28	80.72	--------	--------	--------	--------	--------	--------	5	15.52	22	139	857.97
No. 6	60	526.12	9	11.11	--------	--------	2	2.53	2	7.25	--------	--------	14	87	547.01
No. 7	62	507.29	4	9.20	--------	--------	--------	--------	1	1.93	6	8.95	4	77	527.37
No. 8	63	405.79	5	16.88	--------	--------	1	2.07	3	4.65	2	5.03	21	95	434.42
No. 9	47	342.04	2	9.20	--------	--------	2	2.70	--------	--------	6	29.84	20	77	383.78
Total	742	5,451.71	73	165.49	16	51.30	13	25.85	18	39.27	43	163.86	203	1,108	5,897.48

Tables XXI to XXVI, inclusive, show the consolidated cost of maintenance and upkeep of the various types of surfaced roads under maintenance during the calendar year 1927.

Table XXI—Consolidated statement showing cost of maintenance and upkeep of 5,451.71 miles of concrete roads in all districts for the calendar year 1927.

TABLE XXI—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 5,451.71 MILES OF CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	349,581	$166,720.87	$104,206.85	$39,166.67	$310,094.39	$86,749.95	$396,844.34	$72.79
Upkeep of Roadside—								
Metal shoulders	16,180	$ 7,929.52	$ 4,497.54	$ 2,996.02	$ 15,423.08	$ 4,869.76	$ 20,292.84	$ 3.72
Earth shoulders	534,092	260,792.07	11,952.14	72,526.10	345,270.31	138,234.43	483,504.74	88.68
Ditches and drains	198,422	96,725.44	2,880.04	25,217.33	124,822.81	49,736.21	174,559.02	32.02
Bridges and culverts	44,304	21,627.09	5,850.29	5,433.99	32,911.37	11,330.97	44,242.34	8.12
Markers and safety signs	113,710	57,375.29	9,209.51	14,546.26	81,131.06	32,166.95	113,298.01	20.78
Guard fence	54,361	24,762.08	19,858.73	5,463.26	50,084.07	12,714.81	62,798.88	11.52
Cutting and clearing vegetation	349,853	181,938.39		31,273.16	213,211.55	76,683.77	289,895.32	53.17
Cleaning traveled way	89,224	45,297.98		18,413.32	63,711.30	29,505.66	93,216.96	17.11
Snow removal	143,436	81,746.09		35,732.77	117,478.86	58,394.79	175,873.65	32.26
Total upkeep	1,543,582	$778,193.95	$54,248.25	$211,602.21	$1,044,044.41	$413,637.35	$1,457,681.76	$267.38
Total maintenance and upkeep costs	1,893,163	$944,914.82	$158,455.10	$250,768.88	$1,354,138.80	$500,387.30	$1,854,526.10	$340.17

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* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

Table XXII—Consolidated statement showing cost of maintenance and upkeep of 165.49 miles of brick roads in all districts for the calendar year 1927.

TABLE XXII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 165.49 MILES OF BRICK ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	28,273	$12,384.10	$7,236.89	$2,275.24	$21,896.23	$5,950.76	$27,846.99	$168.27
Upkeep of Roadside—								
Metal shoulders	1,820	$ 876.21	$282.00	$ 276.30	$ 1,434.51	$ 515.33	$ 1,949.84	$ 11.78
Earth shoulders	21,613	10,491.95	369.64	2,659.95	13,521.54	5,388.11	18,909.65	114.26
Ditches and drains	6,945	3,265.04	181.35	998.03	4,444.42	1,871.60	6,316.02	38.17
Bridges and culverts	2,025	962.75	89.52	156.80	1,209.07	583.86	1,792.93	10.84
Markers and safety signs	1,930	915.41	50.71	218.02	1,184.14	447.04	1,631.18	9.86
Guard fence	1,993	953.76	771.61	307.85	2,033.22	753.31	2,786.53	16.84
Cutting and clearing vegetation	10,040	5,053.62	----------	830.09	5,883.71	2,214.89	8,098.60	48.92
Cleaning traveled way	1,931	977.53	----------	454.17	1,431.70	619.00	2,050.70	12.39
Snow removal	3,963	2,104.85	----------	1,298.50	3,403.35	1,824.66	5,228.01	31.60
Total upkeep	52,260	$25,601.12	$1,744.83	$7,199.71	$34,545.66	$14,217.80	$48,763.46	$294.66
Total maintenance and upkeep cost	80,533	$37,985.22	$8,981.72	$9,474.95	$56,441.89	$20,168.56	$76,610.45	$462.93

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment and office overhead for both central and district offices.

Table XXIII—Consolidated statement showing cost of maintenance and upkeep of 51.30 miles of bituminous concrete roads in all districts for the calendar year 1927.

TABLE XXIII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 51.30 MILES OF BITUMINOUS CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	15,206	$10,345.95	$10,115.94	$1,963.02	$22,424.91	$3,811.83	$26,236.74	$511.44
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	1,809	$1,056.16	$93.31	$281.03	$1,430.50	$524.98	$1,955.48	$38.12
Ditches and drains	485	265.21	3.00	49.01	317.22	116.16	433.38	8.44
Bridges and Culverts	110	60.10		6.62	66.72	30.59	97.31	1.90
Markers and safety signs	530	280.56	15.17	64.57	360.30	154.25	514.55	10.03
Guard fence	278	149.47	51.86	30.65	231.98	83.83	315.81	6.15
Cutting and clearing vegetation	2,693	1,730.17		196.51	1,926.68	677.65	2,604.33	50.78
Cleaning traveled way	646	347.88		91.90	439.78	185.09	624.87	12.18
Snow removal	715	498.25		127.13	625.38	232.53	857.91	16.72
Total upkeep	7,266	$4,387.80	$163.34	$847.42	$5,398.56	$2,005.08	$7,403.64	$144.32
Total maintenance and upkeep costs	22,472	$14,733.75	$10,279.28	$2,810.44	$27,823.47	$5,816.91	$33,640.38	$655,76

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

Table XXIV—Consolidated statement showing cost of maintenance and upkeep of 25.85 miles of bituminous macadam roads in all districts for the calendar year 1927.

TABLE XXIV—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 25.85 MILES OF BITUMINOUS MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	4,367	$2,083.24	$1,488.91	$520.81	$4,092.96	$1,118.93	$5,211.89	$201.63
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	3,567	$1,833.56	$44.72	$301.31	$2,179.59	$1,002.69	$3,182.28	$123.11
Ditches and drains	539	268.70		51.60	320.30	131.08	451.38	17.46
Bridges and culverts	41	20.49		7.02	27.51	8.39	35.90	1.38
Markers and safety signs	53	27.20	13.50	3.16	43.86	22.27	66.13	2.56
Guard fence	46	21.99		1.83	23.82	10.53	34.35	1.13
Cutting and clearing vegetation	1,116	593.55		98.52	692.07	276.73	968.80	37.48
Cleaning traveled way	84	44.32		7.63	51.95	34.32	86.27	3.34
Snow removal	542	312.53		38.09	350.62	184.36	534.98	20.69
Total upkeep	5,988	$3,122.34	$58.22	$509.16	$3,689.72	$1,670.37	$5,360.09	$207.35
Total maintenance and upkeep cost	10,355	$5,205.58	$1,547.13	$1,029.97	$7,782.68	$2,789.30	$10,571.98	$408.98

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under Bituminous Macadam do not represent a fair average cost for Maintenance and Upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

Table XXV—Consolidated statement showing cost of maintenance and upkeep of 39.27 miles of waterbound macadam roads in all districts for the calendar year 1927.

TABLE XXV—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 39.27 MILES OF WATERBOUND MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	24,401	$11,090.21	$17.810.76	$5,205.35	$34,106.32	$6,696.93	$40,803.25	$1,039.05
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	3,530	$1,690.85		$283.49	$1,974.34	$880,11	$2,854.45	$72.69
Ditches and drains	3,999	1,900.65		279.65	2,180.30	1,021.54	3,201.84	81.53
Bridges and culverts	62	30.86	$14,85	6.00	51.71	18.03	69.74	1.78
Markers and safety signs								
Guard fence								
Cutting and clearing vegetation	1,436	771.60		69.79	841.39	326.43	1,167.82	29.74
Cleaning traveled way	130	59.57		20.86	80.43	37.00	117.43	2.99
Snow removal	610	299.16		36.74	335.90	205.09	540.99	13.77
Total upkeep	9,767	$4,752.69	$14.85	$696.53	$5,464.07	$2,488.20	$7,952.27	$202.50
Total maintenance and upkeep cost	34,168	$15,842.90	$17,825.61	$5,901.88	$39,570.39	$9,185.13	$48,755.52	$1,241.55

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and districts offices.

Table XXVI—Consolidated statement showing cost of maintenance and upkeep of 163.86 miles of gravel roads in all districts for the calendar year 1927.

TABLE XXVI—CONSOLIDATED STATEMENT SHOWNG COST OF MAINTENANCE AND UPKEEP OF 163.86 MILES OF GRAVEL ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1927.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—								
Paved surface	35,195	$19,060.27	$11,354.40	$2,862.24	$33,276.91	$11,139.89	$44,416.80	$271.06
Upkeep of Roadside—								
Metal shoulders	----	----	----	----	----	----	----	----
Earth shoulders	748	$ 415.98	$ 1.65	$ 88.60	$ 506.23	$ 216.50	$ 722.73	$ 4.41
Ditches and drains	6,519	3,310.06	96.23	508.19	3,914.48	1,888.27	5,802.75	35.42
Bridges and culverts	538	263.45	196.99	43.95	504.39	151.23	655.62	4.00
Markers and safety signs	52	27.90	1.00	19.57	48.47	36.58	85.05	.52
Guard fence	93	41.38	----	3.88	45.26	39.61	84.87	.52
Cutting and clearing vegetation	5,618	2,961.52	----	391.71	3,353.23	1,278.58	4,631.81	28.27
Cleaning traveled way	634	293.62	----	100.95	394.57	248.07	642.64	3.92
Snow removal	743	404.97	----	106.90	511.87	293.95	805.82	4.92
Total upkeep	14,945	$7,718.88	$295.87	$1,263.75	$9,278.50	$4,152.79	$13,431.29	$81.98
Total maintenance and upkeep cost	50,140	$26,779.15	$11,650.27	$4,125.99	$42.555.41	$15,292.68	$57.848.09	$353.04

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under gravel do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

10. MAINTENANCE OF LARGE BRIDGES.—Separate patrols have been created for all large bridges of 100-feet or more in length. Table XXVII shows the number of such bridges located in the various districts, the cost of maintenance and upkeep of same for the calendar year 1927, with the average cost of bridge per district.

11. MAINTENANCE OF DETOURS, UNPAVED AND TEMPORARY ROUTES.—*a. Organization.*—An organization similar to that used in maintaining the surfaced roads is used on the unpaved and temporary routes.

Detours, unpaved routes and gaps in pavement are in charge of the patrolman who is responsible for maintaining right of way and for upkeep of markers and safety signs.

The patrolmen who are employed to do this work are paid on an hourly or monthly basis, depending upon the amount and kind of work on each patrol and the traffic conditions encountered.

b. Equipment.—Each patrolman is required to furnish a team. A light grader and miscellaneous small tools are furnished by the Department.

c. Methods.—Only such funds are expended for the maintenance of detours and temporary routes as may be necessary to care for the traffic in a satisfactory manner. As soon as the construction work which makes the detour necessary is completed, the pavement is opened to traffic and the detour or temporary route is abandoned.

d. Gaps in Pavement.—Gaps in the pavement due to heavy fills and other causes are surfaced temporarily with macadam or gravel.

e. Route Markers and Safety Signs.—As a guide to the traveling public all detours and temporary routes are marked at convenient points with a standard route marker or safety sign used on surfaced roads. Table XXVIII shows combined cost of maintenance and upkeep on all types of detours, unpaved and temporary routes for the calendar year 1927.

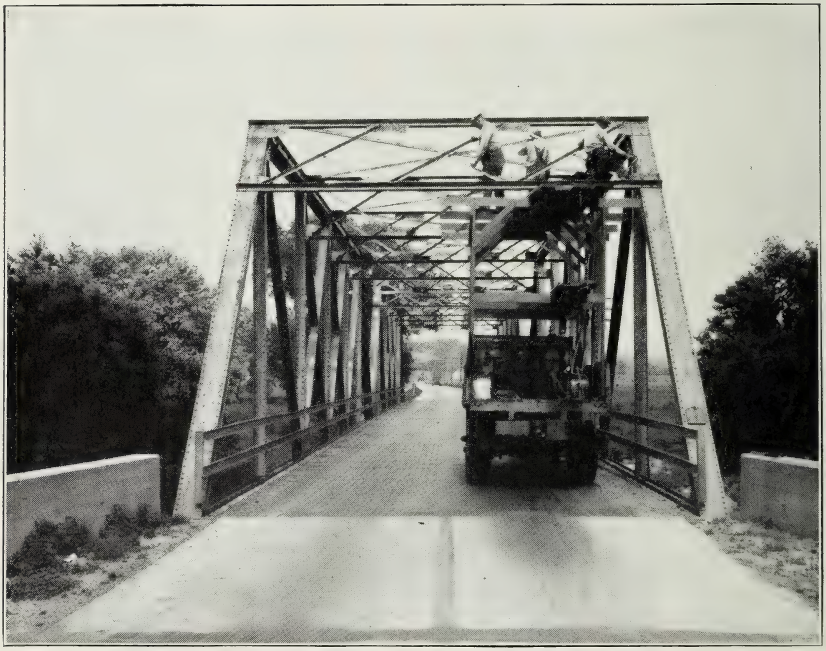

Figure 76.—Maintenance crew painting bridge.

TABLE XXVII—STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF BRIDGES OVER 100 FOOT SPAN (LOCATED IN THE VARIOUS DISTRICTS) FOR THE CALENDAR YEAR 1927.

District.	Number of bridges.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per bridge.
No. 1	53	1,986	$1,129.19	$143.70	$564.37	$1,837.26	$560.19	$2,397.45	$45.23
No. 2	26	2,376	1,217.32	43.09	63.70	1,324.11	524.82	1,848.93	71.11
No. 3	25	3,946	2,021.83	769.15	133.22	2,924.20	1,551.11	4,475.31	179.01
No. 4	18	2,592	1,271.33	232.82	464.97	1,969.12	494.18	2,463.30	136.85
No. 5	22	340	167.42	106.00	30.35	303.77	99.90	403.67	18.35
No. 6	14	1,240	598.34	850.43	170.44	1,619.21	348.23	1,967.44	140.53
No. 7	4	1,240½	557.85	110.12	55.48	723.45	246.63	970.08	242.52
No. 8	21	9,135½	3,878.25	1,278.24	1,086.04	6,242.53	1,600.73	7,843.26	373.49
No. 9	20	6,580	3,186.02	403.68	488.98	4,078.68	1,523.55	5,602.23	280.11
Total	203	29,436	$14,027.55	$3,937.23	$3,057.55	$21,022.33	$6,949.34	$27,971.67	$137.79

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XXVIII—CONSOLIDATED STATEMENT SHOWING THE COST OF MAINTENANCE AND UPKEEP ON ALL TYPES OF DETOURS, UNPAVED AND TEMPORARY ROUTES FOR THE CALENDAR YEAR 1927.

District.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.
Maintenance of Wearing Surface—							
Paved surface	261,398	$150,687.07	$50,426.09	$30,736.66	$231,849.82	$72,194.47	$304,044.29
Upkeep of Roadside—							
Metal shoulders							
Earth shoulders	1,510½	721.79		54.14	$775.93	$384.62	$1,160.55
Ditches and drains	7,661½	3,519.99	143.32	467.66	4,130.97	1,861.66	5,992.63
Bridges and culverts	9,048	4,429.87	2,206.10	916.30	7,552.27	2,314.84	9,867.11
Markers and safety signs	6,564½	3,158.43	94.82	722.83	3,976.08	1,942.55	5,918.63
Guard fence	2,481½	1,104.68	415.77	207.65	1,728.10	690.51	2,418.61
Cutting and clearing vegetation	4,382	1,882.79		420.31	2,303.10	923.34	3,226,44
Cleaning traveled way	477	239.05		37.78	276.83	106.43	383.26
Snow removal	2,369½	1,491.50		129.89	1,621.39	831.84	2,453.23
Total upkeep	34,494½	$16,548.10	$2,860.01	$2,956.56	$22,364.67	$9,055.79	$31,420.46
Total maintenance and upkeep cost	295,892½	$167,235.17	$53,286.10	$33,693.22	$254,214.49	$81,250.26	$335,464.75

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

Table XXIX—Consolidated statement showing comparison of miles and cost of various types of detour roads maintained during the calendar year 1927.

TABLE XXIX—STATEMENT SHOWING COMPARISON OF MILES AND COST OF VARIOUS TYPES OF DETOUR ROADS MAINTAINED DURING THE CALENDAR YEAR 1927.

	Earth.	Gravel.	Cinders.	Macadam.	Oiled earth.	Shale.	Miscellaneous.	Total.
Miles maintained	267.33	86.41	12.05	13.24		4.02	9.27	392.32
Maintenance of Wearing Surface—								
Paved surface	$119,337.80	$109,136.07	$38,344.47	$20,301.72		$13,123.32	$3,800.91	$304,044.29
Upkeep of Roadside—								
Metal shoulders								
Earth shoulders	$ 119.30	$ 822.92	$ 200.02	$ 18.31				$1,160.55
Ditches and drains	2,710.93	1,201.19	1,863.71	87.83			$ 128.97	5,992.63
Bridges and culverts	1,833.05	3,185.92	2,134.76	278.92		$640.72	1,793.74	9,867.11
Markers and safety signs	3,582.43	1,386.33	140.90	414.74		59.69	334.54	5,918.63
Guard fence	448.81	679.19	596.76	590.82		28.57	74.46	2,418.61
Cutting and clearing vegetation	180.53	2,658.26	326.88	30.38		30.39		3,226.44
Cleaning traveled way	58.82	255.35	46.74	17.89			4.46	383.26
Snow removal	1,680.70	554.08	153.75	12.13		52.57		2,453.23
Total upkeep	$10,614.57	$10,743.24	$5,463.52	$1,451.02		$811.94	$2,336.17	$31,420.46
Total maintenance and upkeep cost	$129,952.37	$119,879.31	$43,807.99	$21,752.74		$13,935.26	$6,137.08	$335,464.75

Table XXX—Consolidated statement showing comparison of mileage and costs on per mile basis for detour roads by types and units for the calendar year 1927.

TABLE XXX—STATEMENT SHOWING COMPARISON OF MILEAGES AND COSTS ON PER MILE BASIS FOR DETOUR ROADS BY TYPES AND UNITS FOR THE CALENDAR YEAR 1927.

	Earth.	Gravel.	Cinders.	Macadam.	Oiled earth.	Shale.	Miscellaneous.
Miles maintained	267.33	86.41	12.05	13.24		4.02	9.27
Maintenance of Wearing Surface—							
Paved surface	$446.41	$1,263.00	$3,182.12	$1,533.37		$3,264.51	$410.02
Upkeep of Roadside—							
Metal shoulders							
Earth shoulders	$ .45	$ 9.52	$ 16.60	$ 1.38			
Ditches and drains	10.14	13.90	154.66	6.63			$ 13.91
Bridges and culverts	6.86	36.87	177.16	21.07		$159.38	193.50
Markers and safety signs	13.40	16.04	11.69	31.32		14.85	36.09
Guard fence	1.68	7.86	49.52	44.62		7.11	8.03
Cutting and clearing vegetation	.68	30.76	27.13	2.29		7.56	
Cleaning traveled way	.22	2.96	3.88	1.35			.48
Snow removal	6.28	6.42	12.76	.92		13.08	
Total upkeep	$39.71	$124.33	$453.40	$109.58		$201.98	$252.01
Total maintenance and upkeep	$486.12	$1,387.33	$3,635.52	$1,642.95		$3,466.49	$662.03

Table XXXI—Consolidated statement showing the number of patrols and miles of various types of detour roads maintained on a calendar year basis for 1927 in all districts.

TABLE XXXI—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF DETOUR ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1927 IN ALL DISTRICTS.

District.	Earth.		Gravel.		Cinders.		Shale.		Macadam.		Oiled earth.		Miscellaneous.		Total.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1			16	35.43	1	.12			5	8.00					22	43.55
No. 2	18	27.65	7	2.03	1	.02			2	1.63					28	31.33
No. 3	6	64.37	8	4.49					7	2.77			7	1.09	28	72.72
No. 4	28	53.51	24	11.82	2	.76									54	66.09
No. 5	4	7.02											1	6.11	5	13.13
No. 6	8	26.46	8	1.57	3	3.05	5	4.02							24	35.10
No. 7	4	14.34	16	17.74	3	.50									23	32.58
No. 8	10	25.96	3	.70	7	7.09			2	.39					22	34.14
No. 9	24	48.02	13	12.63	2	.51			4	.45			1	2.07	44	63.68
Total	102	267.33	95	86.41	19	12.05	5	4.02	20	13.24			9	9.27	250	392.32

12. ADDITIONS AND BETTERMENTS.—After the original construction of the road has been completed, it is often found necessary to construct new baffle walls, culverts, retaining walls, curb and gutters or to widen the pavement on curves, erect new route markers or safety signs or otherwise to improve the existing roads. These items are paid from the construction funds since they are considered permanent improvements to the roads already built. In order to control the construction of these items and the funds involved the District Engineer is required to secure an authorization for all the contemplated work, showing the location and description of such work together with an estimate of its cost before the work is permitted to be done or the funds expended. The cost of such work is kept separate from maintenance costs.

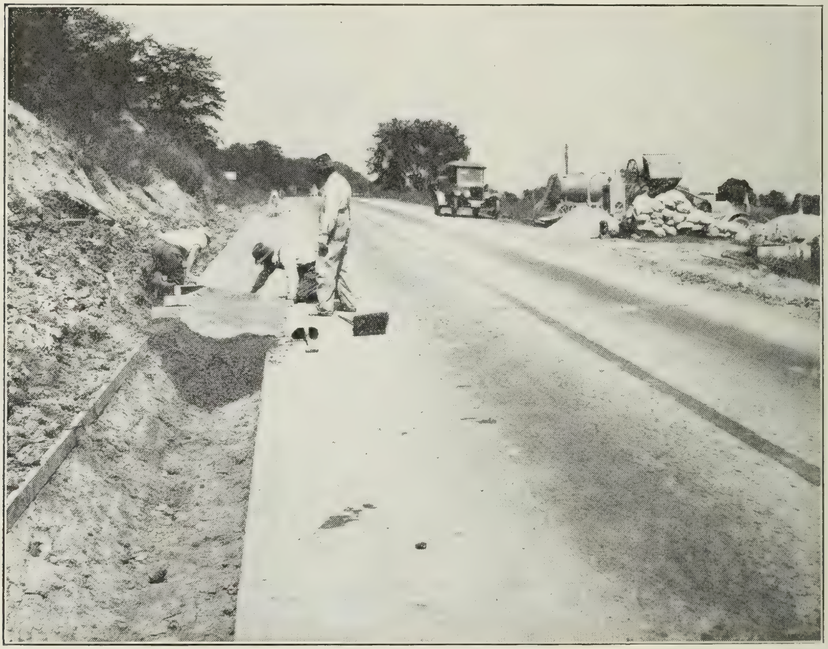

Figure 77—Maintenance crew building gutter section.

Table XXXII shows the amount spent in each district for such purposes during the calendar year 1927.

TABLE XXXII—STATEMENT SHOWING COST OF ADDITIONS AND BETTERMENTS FOR THE CALENDAR YEAR 1927.

District.	Total Cost.	District.	Total Cost.
No. 1	$25,906.44	No. 7	7,449.71
No. 2	14,217.26	No. 8	3,108.78
No. 3	17,949.45	No. 9	9,093.61
No. 4	56,341.22		
No. 5	24,092.25	Total	$180,923.68
No. 6	22,764.96		

13. POLICING OF THE STATE HIGHWAY SYSTEM.—*a. Organization and Duties.*—A highway police organization is maintained to enforce the provisions of the Motor Vehicle Act and to prevent overloading of the pavement. It consists of one chief, twelve sergeants, one hundred forty officers, and six mechanics. Their duties are to weigh trucks, warn speeders, arrest drunken and reckless drivers, recover stolen cars, and to furnish information to the public relating to the legal use of the road.

b. Equipment.—Each sergeant is equipped with a car; the patrol officers are furnished with a motorcycle and side car and a set of portable scales for weighing trucks. Uniforms are furnished by the Division of Highways.

c. Work Accomplished.—Table XXXIII shows the work accomplished by this force during the calendar year 1927:

TABLE XXXIII—ANNUAL REPORT OF STATE HIGHWAY PATROL OFFICERS FOR THE YEAR 1927.

ARRESTS.

Abduction	1	Intoxicated drivers	250
Accepting bribes	1	Insane Patients apprehended	16
Altering license plates	26	Jail breaking	2
Arson	1	Jumping board bill	1
Assault and battery	1	Licenses (chauffeur's)	114
Assault with deadly weapon	2	Licenses (duplicate)	9
Attempt to blackmail	1	Licenses (Section 14)	273
Attempt to commit murder	1	Licenses (fictitious)	230
Bad brakes	28	Licenses (none)	66
Bad tires	81	Leaving scene of accident	4
Bastardy	1	Lights	168
Bank robbers	7	Mail robbers	3
Blocking police vehicle	1	Mann act	1
Blocking traffic	3	Manslaughter	3
Burglary	61	Mirrors (none)	97
Boulevard stops	248	Motor number (none)	1
Car thieves	120	Murderers	9
Chicken thieves	4	Non-support	2
Child deserter	1	Parole violators	5
Confidence game	7	Parking on pavement	10
Conspiracy	1	Petty larceny	7
Contributing to delinquency of children	2	Possessing stolen property	3
Cut out whistles, etc	14	Planking edges of pavement	2
Deserter from U. S. army	2	Racing on highway	4
Deserter from Military academy	1	Rape	6
Disorderly conduct	188	Reciprocity	1
Disposing of stolen property	3	Reckless driving	332
Dyer act	15	Resisting an officer	2
Embezzlement	2	Road and bridge law (Sec. 145)	6
Escaped convicts	7	Runaway boys	7
Escaped federal prisoners	1	Speeding busses	77
Forgery	9	Speeding motorcycles	5
Grand larceny	185	Speeding passenger cars	509
Highway robbery	3	Speeding trucks	223
Holdup with gun	1	Trucks, overloaded	595
Horse thieves	1	Trucks, overwidth	8
Impersonating an officer	3	Vagrancy	3
Intoxication	72	Walking on wrong side of pavement	4

Total arrests for 1927	4,164

WARNINGS GIVEN.

Boulevard stops	1,453
Defective tires	170
License plates	3,776
Lights	37,345
Parking on pavement	539
Reckless drivers	356
Speeders	17,847
Trucks, weighed	9,201

ASSISTANCE RENDERED PUBLIC.

Assistance rendered public	950
Funerals taken care of	788
Lives saved	5
Stolen cars recovered	292
Value of recovered stolen property	$164,366.15

Figure 78—Chart showing division of costs of Highway Police Officers for the calendar year 1927.

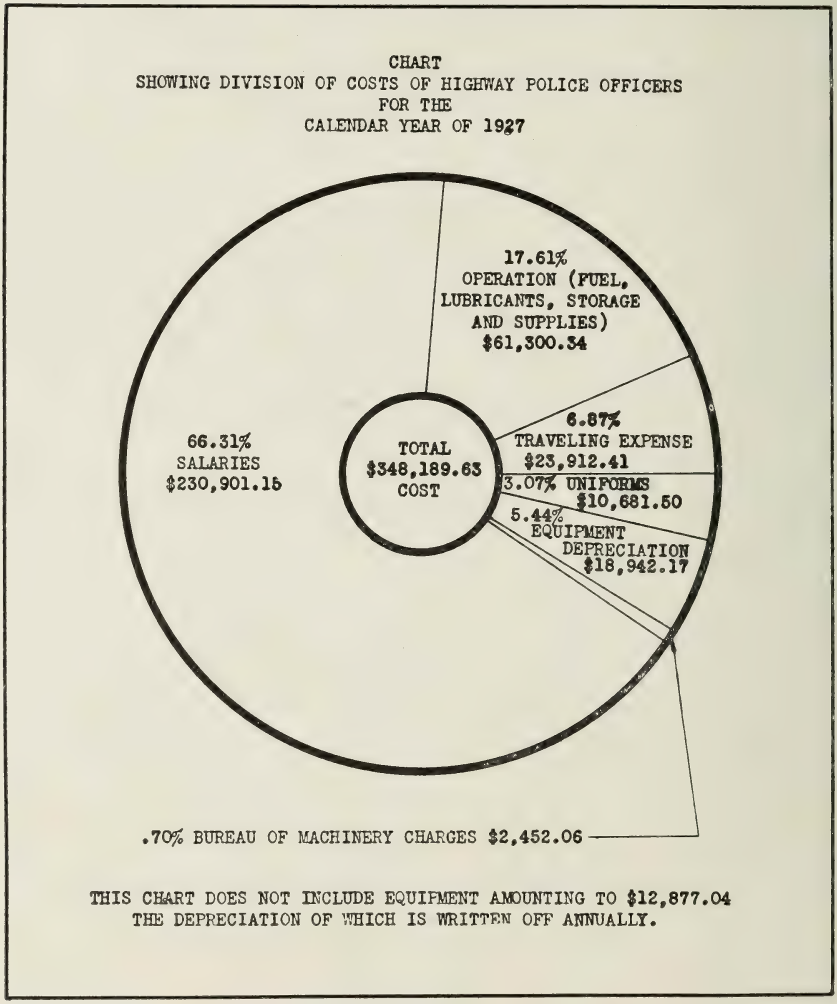

Figure 78.

V. BUREAU OF MATERIALS.

1. GENERAL.—The Bureau of Materials is responsible for the inspection of all materials used in the construction and maintenance of roads and bridges built under the supervision of the Division of Highways; the inspection of materials used in county and township road and bridge construction when inspection is requested, the investigation of new materials, methods of tests, and pavement design and construction; and the preparation of specifications. The Bureau also handles all of the paint used in construction and maintenance work, maintains a photographic department for use of the Division, and machine and wood-working shops.

The Bureau is administered by the Engineer of Materials, assisted by the heads of the various sections of the organization and by the District Engineers of Materials. The District Engineers of Materials, located at the various district headquarters, have general supervision of the material inspectors located at the plants and of the materials used in their respective districts.

The activities of the Bureau are handled through the following sections: general office, physical laboratory, chemical laboratory, concrete laboratory, aggregate and lumber inspection, cement and steel inspection, investigations and Departmental service.

The field inspection of materials is handled by inspectors located at the material plants making shipments of appreciable quantities of materials. In instances where it is practicable, a single inspector covers the work at more than one plant. The placing of inspectors, however, is such as to give the best service to the producers and contractors with a minimum of expense and loss of time.

The data obtained from investigational work enables the Department to standardize the quality of the materials for highway construction, to provide better inspection and to furnish reliable data relating to methods of design and construction.

2. GENERAL OFFICE.—During 1927 the method of handling correspondence, data, and records of tests was simplified and co-ordinated to provide more efficient handling of the work. During the construction season, it is essential that test reports and correspondence be handled promptly. If it is not, expensive delays may result to the contractor.

3. SPECIFICATIONS.—Specifications for materials and construction methods are being constantly studied in order to bring them to the highest standards. Considerable time was devoted to investigations of methods of tests, quality of materials, and to methods of pavement design and construction in an effort to perfect the specifications.

4. LABORATORY INSPECTION OF MATERIALS.—The Bureau is equipped to make complete tests of nearly every type of material used in highway work. The samples tested generally fall into one or more of the following classes: preliminary samples, samples for acceptance tests, or samples for detailed examination.

a. Preliminary Samples.—Preliminary samples are frequently submitted by manufacturers and producers who are contemplating offering their products for use in State work. Acceptances of preliminary samples, however, is never construed as acceptance of all materials produced at a particular plant; only materials actually offered for acceptance are considered. When plant inspection is carried on, the Division reserves the right to make retests at destination and to reject the material should it fail to comply with the specifications.

b. Acceptance Tests.—Acceptance tests are made on samples of materials which have arrived at the construction site without previous inspection; which have been stored for a considerable length of time or in an unapproved manner; which do not appear satisfactory when received on the work; and on samples of materials which can not be inspected in the field on account of the intricate nature of the chemical and special physical tests required. In such cases, the materials are sampled by trained engineers and sent to the main laboratory for examination.

c. Detailed Examination of Samples.—Special tests which are more comprehensive than are possible in the field are performed on representative samples to obtain additional information as to the quality of the various materials furnished for highway construction. These tests also make it possible to keep a close check on the quality of the materials.

In addition to the regular laboratory work, monthly check tests are made on the inspection methods of the various cement inspectors as follows: samples are sent to each cement inspector and to the U. S. Bureau of Public Roads. These samples are tested by the main laboratory, by the field inspectors and by the Bureau of Public Roads and the results compared.

Table XXXIV shows the number of samples tested in the Springfield laboratory during 1927. Table XXXV shows the number of samples tested for the Illinois Department of Purchases and Construction. Acceptance tests were made on the total number of samples shown in both of these tables. The distribution of the work by the number of samples tested was as follows: chemical laboratory 2,298, physical laboratory 7,253, and physical and chemical laboratories combined 1,062. During the winter months, 63 samples of sand, 51 samples of gravel, and 22 samples of crushed stone were subjected to detailed examinations. These are not included in tables.

TABLE XXXIV—NUMBER OF SAMPLES TESTED IN THE SPRINGFIELD LABORATORY FOR HIGHWAY WORK IN ILLINOIS.

Material.	Number of Samples.	Material.	Number of Samples.
Aggregate	117	Road oil	248
Asphalt	74	Steel	230
Calcium chloride	51	Tar, pitch and creosote	25
Cement	1,767	Water	62
Gasoline	23	Miscellaneous	279
Lubricating oils	208		
Paint materials	99	Total	8,179
Pavement cores	5,014		

TABLE XXXV—NUMBER OF SAMPLES TESTED IN THE SPRINGFIELD LABORATORY FOR THE ILLINOIS DEPARTMENT OF PURCHASES AND CONSTRUCTION.*

Material.	Number of Samples.	Material.	Number of Samples.
Black oil	1	Turpentine	2
Crusher oil	1	Varnish	2
Linseed oil	11	White enamel	1
Lubricating oil and greases	260	White lead	1
Paint	1	White lead paste	1
Red Oxide Pigment	1	Zinc oxide paste	2
Red paint	1		
Transmission oil	7		
Total			292

* The material represented by these samples was for the use of various State institutions. The Department of Purchases and Construction is charged for this inspection service at actual cost.

5. FIELD INSPECTION OF MATERIALS.—Field inspection of aggregates was started in the early part of 1920 and it proved so satisfactory that this type of inspection was established for other highway materials. In general, it might be said that plant inspection expedites the work of the contractors by preventing the shipment of unsatisfactory materials to the work and consequent delays attending their disposal; protects the producer from losses which would occur through rejections at destination; reduces the cost of the materials by providing for more efficient plant operation; and provides better control of quality, thereby assisting in the maintenance of the high construction standards.

Table XXXVI shows the quantity of materials accepted at plants for highway work in Illinois and unit cost of inspection for the calendar year 1927. Table XXXVII shows the quantity of materials inspected for other departments of the State of Illinois and for other states during the calendar year 1927.

TABLE XXXVI—QUANTITY OF MATERIALS ACCEPTED AND UNIT COST OF INSPECTION FOR THE CALENDAR YEAR 1927.

Material.	Maximum number employees.	Total quantity accepted.	Unit cost of plant inspection.		Inspection costs in per cent of total contracts awarded in 1927.
			Without overhead.	With overhead.	
Aggregate	48	2,140,020 cu. yd.	0.047 cu yd.	0.066 cu. yd.	0.770%
Asphalt	2	5,536,609 lbs.	0.234 ton	0.297 ton	0.004%
Cement	22	2,379,304 bbls.	0.0121 bbls.	0.0177 bbls.	0.230%
Lumber	3	1,725,897 bd. ft.	1.267 M. bd. ft.	1.626 M. bd. ft.	0.015%
Paint	2	29,834 gal.	0.017 gal.	0.03 gal.	0.004%
Paving brick	2	3,317,434	0.402 M.	0.583 M.	0.010%
Steel—Chicago Dist	7	21,359,069 lbs.	0.677 ton	0.963 ton	0.056%
Steel—St. Louis Dist	2	11,008,912 lbs.	0.246 ton	0.319 ton	0.009%
Tile	9	16,830			

NOTE.—The total quantities of materials inspected at plants are greater than the quantities shown above on account of the rejections and diversions. The inspection costs as given above are based upon accepted materials only.

The total cost of inspection including laboratory overhead for the calendar year 1927 was 1.09 per cent of the total value of paving contracts awarded during the same period (based on contract value of $18,286,152.06). This figure, however, is comparative only.

TABLE XXXVII—QUANTITY OF MATERIALS INSPECTED FOR OTHER DEPARTMENTS, OF THE STATE OF ILLINOIS AND FOR OTHER STATES DURING THE CALENDAR YEAR 1927.

Account.	Quantity inspected.		
	Aggregate.	Cement.	Steel (Chicago.)
State of Illinois—			
Department of Agriculture		7,889 bbls.	
Department of Public Welfare		15,833 bbls.	
Division of Waterways	60,561 cu. yds.	102,874 bbls.	
State of Iowa	17,419 cu. yds.	77,245 bbls.	180,100 lbs.
State of Michigan		15,523 bbls.	
State of Missouri		132 bbls.	531,106 lbs.
State of Tennessee			55,906 lbs.
State of Wisconsin			8,774,881 lbs.
Total	77,980 cu.yds.	219,496 bbls.	9,541,993 lbs.

All the materials listed above were inspected at plants where inspectors were stationed for the purpose of conducting inspection on materials shipped for our own work, and it was not necessary to employ additional help. The Division of Highways is paid for this work at actual cost.

Field inspection of the various materials was conducted during the calendar year 1927 as follows:

a. Aggregates.—The following quantities of aggregates were inspected:

Account.	Material.	Quantity.
State of Illinois—		
Division of Highways	Sand	793,419 cu. yds.
Division of Highways	Gravel	851,034 cu. yds.
Division of Highways	Crushed Stone	547,736 cu. yds.
Division of Highways	Stone Screenings	8,773 cu. yds.
Division of Highways	Novaculite	4,484 cu. yds.
Division of Waterways	Pit run gravel	60,561 cu. yds.
State of Iowa	Sand and gravel	17,419 cu. yds.
Total		2,283,426 cu. yds.

Out of the quantities of aggregates shown above for the Illinois Division of Highways, 65,426 cubic yards were rejected in approximately the same ratio as the figures shown for the different types inspected.

To inspect this material, plant inspection was maintained at eighty-four sand and gravel plants and twenty-eight crushed stone plants, making a total of 112 plants. The number of aggregate inspectors varied in accordance with the construction activities, the maximum number in the field at any one time being forty-eight.

b. Asphalt.—5,536,609 pounds of asphalt were inspected at two plants, two inspectors being employed. Asphalt is inspected during the process of manufacture. This method gives the refinery an opportunity to correct the material before it leaves the still in case the preliminary tests show unsatisfactory materials. The inspector also checks the lot and batch numbers when the material is loaded into the cars.

c. *Cement.*—The following quantities of cement were inspected:

Account.	Quantity.
State of Illinois—	
Division of Highways	2,379,304 bbls.
Department of Agriculture	7,889 bbls.
Department of Public Welfare	15,833 bbls.
Division of Waterways	102,874 bbls.
State of Iowa	77,245 bbls.
State of Michigan	15,523 bbls.
State of Missouri	132 bbls.
Total	2,598,800 bbls.

The inspection of cement for the Illinois Division of Highways alone required 118,750 samples. In addition to the tests which were made on each of these samples, 7 and 28-day strength tests were made on composite samples from each car and chemical tests were made at frequent intervals on each brand of cement as a further check on its quality.

Plant inspection was maintained at fourteen cement plants located in Illinois, Indiana and Missouri. The number of inspectors varied throughout the year according to the construction activities, the maximum number at any one time being twenty-two.

The thoroughness of cement inspection is illustrated by stating that from ten to twenty samples are selected from each carload of cement as it is loaded, and each sample is tested separately; if a single sample fails or shows the slightest indication of unsoundness or irregularity in setting properties, the entire car of cement is rejected.

d. *Lumber.*—The following quantities of lumber were inspected:

Material.	Quantity.
Treated and untreated lumber	365,788 bd. ft.
Piling of different species	395,388 bd. ft.
White cedar guard fence posts	964,721 bd. ft.
Total	1,725,897 bd. ft.

To inspect this material, field inspection was made at numerous shipping points in Minnesota, Wisconsin and Michigan; at two yards in St. Louis, at various creosoting plants and at construction sites. The inspection of creosoted material at the creosoting plants enables the inspector to determine not only the quality of the lumber but the preservative treatment as well.

e. *Paint.*—The following quantities of paint were inspected:

Material.	Quantity.
Sublimed blue lead paint	11,460 gals.
White lead paint	18,195 gals.
Stencil Paint	179 gals.
Total	29,834 gals.

Since paint is purchased directly by this Division, it is possible to maintain very strict inspection. The separate materials used in grinding the paint are first tested in the laboratory before the manufacture is undertaken. The plant inspector watches the grinding operations and the proportioning of the materials, weighs the mixed paint and checks the total yield of the various batches produced. The Bureau also keeps in touch with the application of the paint in the field, and if trouble is experienced, an investigation is made to determine and remedy the cause.

f. Paving Brick.—During the calendar year 1927, 3,317,434 paving brick were inspected. Plant inspection was maintained at two brick plants, two inspectors being used for this work. Paving brick inspection is carried on during the loading of the cars. The inspector takes his samples at this time and makes the rattler and other tests required.

g. Steel.—The following quantities of steel were inspected:

Account.	Quantity.	
	In Chicago district.	In St. Louis district.
State of Illinois—		
Division of Highways	21,359,069 lbs.	11,008,912 lbs.
State of Iowa	180,100 lbs.	
State of Missouri	531,106 lbs.	
State of Tennessee	55,906 lbs.	
State of Wisconsin	8,774,881 lbs.	
Total	30,901,062 lbs.	11,008,912 lbs.

To inspect this material, plant inspection was maintained at thirteen steel warehouses and mills in the Chicago district and at eight in the St. Louis district. The tests are conducted in a branch steel laboratory in the Chicago district. This laboratory is centrally located with respect to the mills and warehouses and is equipped with a 100,000 pound Universal testing machine, a cold bend testing machine and other necessary equipment for steel testing. In the St. Louis district the producer's equipment is used. Seven inspectors were used in the Chicago district and two were used in the St. Louis district.

The steel inspected consists of reinforcing steel, metal strip and other steel products used in bridge and pavement construction. The inspection includes the sampling and testing of the steel in the mill or warehouse before it is loaded and the supervision of the cutting, bending and loading. Concrete reinforcement bars are tested for tensile strength and bending properties. In addition, all shipments are carefully inspected for undersized or poorly rolled bars and for bars having surface defects or which show poor workmanship of any kind. Metal strip is inspected during the process of manufacture to insure proper dimensions, alignment, rigidity, riveting and painting.

h. Drain Tile.—During the calendar year 1927, 16,830 drain tile were inspected. These tile varied widely in size and type. Tile are usually inspected by the District Engineers of Materials or their assistants, and on the construction sites. In some instances, however, as in the case of large orders, plant inspection is carried on but inspectors are not assigned to this work. Drain tile are inspected for size and quality.

6. INSPECTION OF NEW MATERIAL DEPOSITS.—The Bureau of Materials continued the study of the material resources of the State during the calendar year 1927, as a cooperative project with

the State Geological Survey. The material resources of the State have been so completely developed by this work however, that such new deposits as are located from time to time, make no appreciable difference in the present cost of materials.

7. INSPECTION OF SEED FOR MAINTENANCE WORK.—The inspection of the seed purchased for maintenance work was undertaken for the first time. Seed with a high per cent of purity and germination power were secured at a reduction of former costs because of this work. The tests were made by the State Division of Plant Industry.

8. RESEARCH AND INVESTIGATIONS.—The following investigation of work was carried on during 1927 for the purpose of testing out new equipment and methods of tests, securing more complete information as to the quality of materials than is obtained by means of the acceptance tests, and securing additional data relative to pavement design and construction:

a. Durability of Paint for Steel Structures.—This investigation which was started in April 1926 for the purpose of determining the quality of various combinations of ingredients and kinds of pigments in paint when applied to steel and exposed to the action of the elements, was continued during 1927.

b. Effect of Zinc Chloride on White Lead Paint.—This investigation was conducted to determine whether or not zinc chloride, when used as a wood preservative, will discolor white lead paint applied directly over the preservative or over various primer paints.

c. Suitability of Various Sizes of Steel for Reinforcing.—This investigation was more or less of a continuation of the previous work covering hard grade new billet and re-rolled rail steel. Various sizes of structural, intermediate, hard grade new billet and re-rolled rail steel were used for this work.

d. Aggregate Durability Tests.—These investigations were continued during 1927. They are designed to obtain information as to the suitability of the alternate freezing and thawing test and the sodium sulphate soundness test, and to furnish additional information as to the resistance of aggregates to the disintegrating action of the weather.

e. Transvere Testing Apparatus.—Several different types of transverse testing machines were designed and tested during 1927 in an effort to secure a machine which could be easily transported and which would give consistent results when used under the various field conditions. Machines of this kind furnish quick data as to quality of concrete and provide a means whereby pavements may be opened to traffic on the basis of the strength of the concrete.

f. Bulking of Fine and Coarse Aggregates.—This work was a continuation of the investigation started in 1925. Field tests were made with the void-bulkmeter shown in Figure 79 and laboratory tests were made on 63 different sands. It is believed that the results of this work will be the means whereby a more workable concrete, a better finish with less water and a saving of cement without a sacrifice of strength, will be obtained.

g. Weight vs. Volume Proportioning of Aggregates.—An investigation was undertaken to determine the relative merits of weight and volume proportioning of aggregates. This study is particularly interesting and important from the fact that former investigations of the volumetric method of proportioning have shown that a variable moisture content in the sand may affect the resulting volume as much as thirty per cent, that the shape of particles in the coarse aggregate and their relative location in the batch may affect the volume of coarse aggregate per batch as much as eight per cent; that the gradation of the coarse aggregate affects the volume of each batch of concrete and that uniform quality of concrete can not be expected from successive batches of aggregate delivered to the mixer. The weight method assures that each batch has the same solid content. Further, the moisture content of the aggregates is determined and compensated for, thereby permitting accurate control of the water content, which is an important feature.

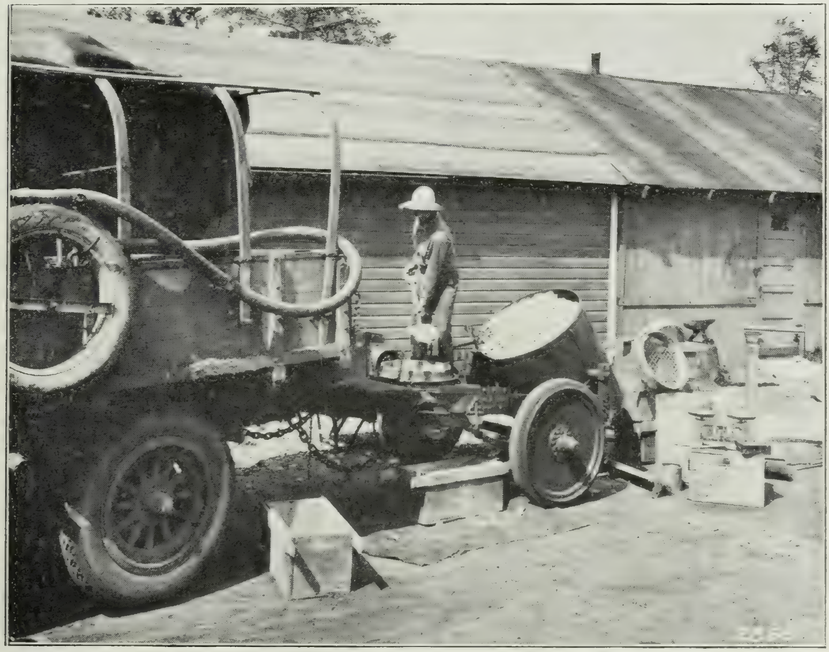

Figure 79.—Void-bulkmeter, showing sifting of materials.

h. Effect of Low Temperatures on Quality of Concrete.—This investigation was undertaken to determine the effect of low temperatures on the quality of concrete, and to test certain construction practices designed to improve the quality of concrete poured under low temperature conditions.

i. Strength of Various Pavement Designs.—Sixteen different pavement designs were studied in the laboratory and tests were made on the standard 9-6-9 design in the field. This work included the determination of the approximate position of maximum stressed section at a corner, section modulus and relative strength factors, bending moment in terms of the load, equivalent uniform thicknesses, relative amounts of concrete required for various designs, effect of longitudinal edge bars on corner stresses, stresses caused by various moving wheel loads for various subgrade conditions and safe moving wheel loads for various moduli of rupture and for different factors of safety. With this data, the characteristics of practically any concrete pavement can be obtained within reasonable limits.

j. Multiple Loading.—This investigation, started in November 1926 and completed in June 1927, was conducted to determine the magnitude of the wheel loads and the spacing of the two rear axles on six-wheel trucks which would not produce stresses in concrete pavement exceeding those produced by a four-wheel truck carrying the legal load limit.

Prior to 1927, the Illinois Motor Vehicle Act permitted a maximum axle load of 16,000 pounds and a maximum gross weight of the vehicle and load combined of 24,000 pounds. The present standard pavement is designed for a maximum wheel load of 8,000 pounds. The following tests were made:

The six-wheel truck shown in Figure 80 was loaded with a maximum wheel load of 8,000 to determine the effect on the standard 9-6-9 pavement; the effect of a four-wheel truck was determined at the same time; and, heavy static loads were applied on the edge of the pavement by means of the loading apparatus shown in Figure 81. The fibre deformations and deflections caused by various loads and systems of loading to which the pavement was subjected were also measured by the strain gage and Ames dials shown in Figure 82. The results obtained were considered sufficient to justify the recommendations of the Department that the Illinois Motor Vehicle Act be amended to permit the use of six-wheel trucks providing the gross weight, including the weight of the vehicle and maximum load, shall not exceed 40,000 pounds, nor the axle spacing be less than forty inches, center to center. The maximum axle load of 16,000 pounds still remains as the legal limit.

k. Highway Fill Settlement.—Further studies of the settlement of highway embankments by watersoaking were made during the summer of 1927. Six embankments were watersoaked to determine the effect of this work on newly constructed embankments. Cross sections to determine the amount of settlement which had taken place were also taken on the pavement constructed over the embankments watersoaked during the summer of 1926. The data obtained showed satisfactory results in both cases.

9. PREPARATION OF REPORTS AND BULLETINS.—Reports of all research and investigations carried on by the Bureau of Materials were prepared, and the following technical bulletins were issued during 1927, for the use of the Bureaus and Districts:

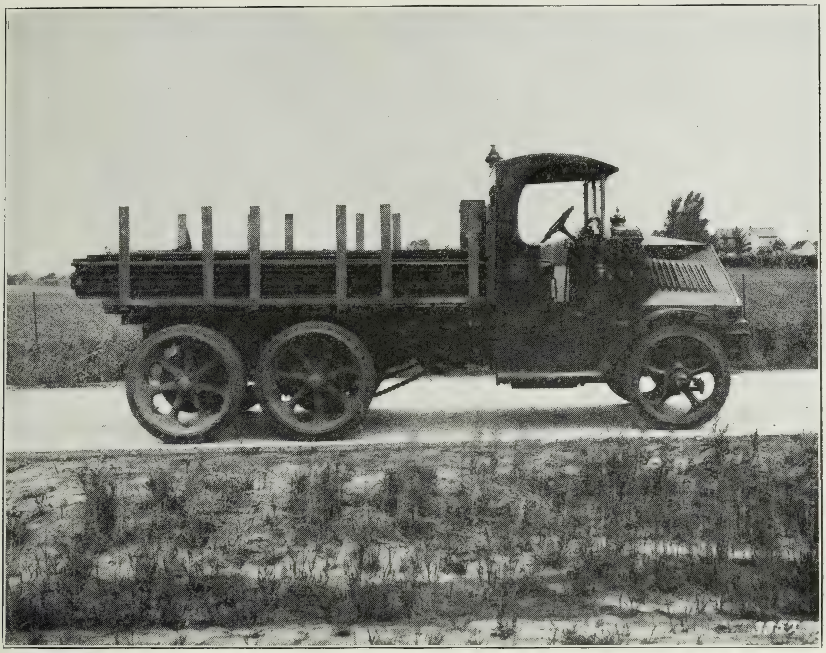

Figure 80.—Side view of six-wheel truck, loaded.

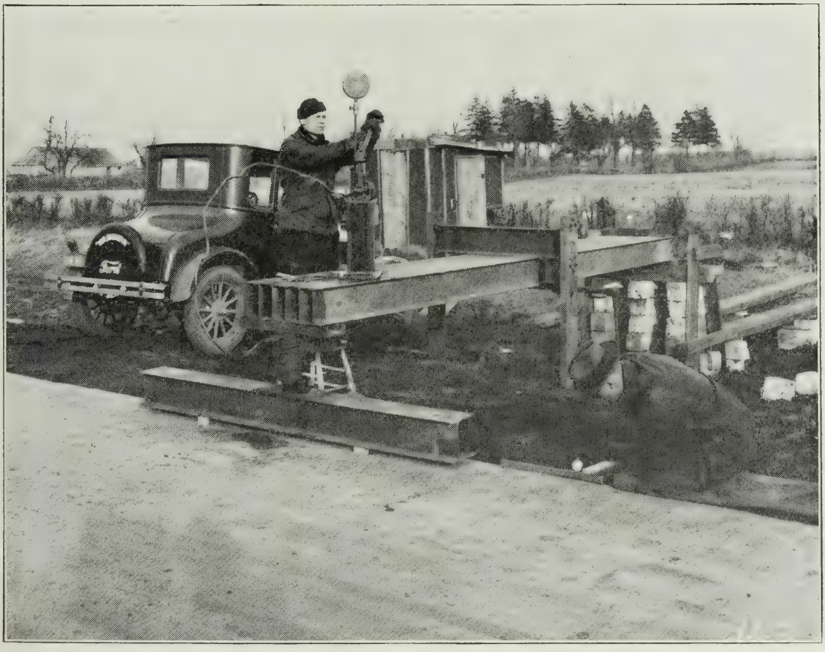

Figure 81.—Loading apparatus used to apply heavy static loads on the edge of pavement.

Technical Bulletin No. 4. Acceleration of Settlement of Highway Embankments.

Technical Bulletin No. 5. Bulking of Fine and Coarse Aggregates.

Technical Bulletin No. 6. Instructions for Making Concrete Beams for Transverse Tests.

10. DEPARTMENTAL SERVICE.—The following departmental services were rendered by this Bureau:

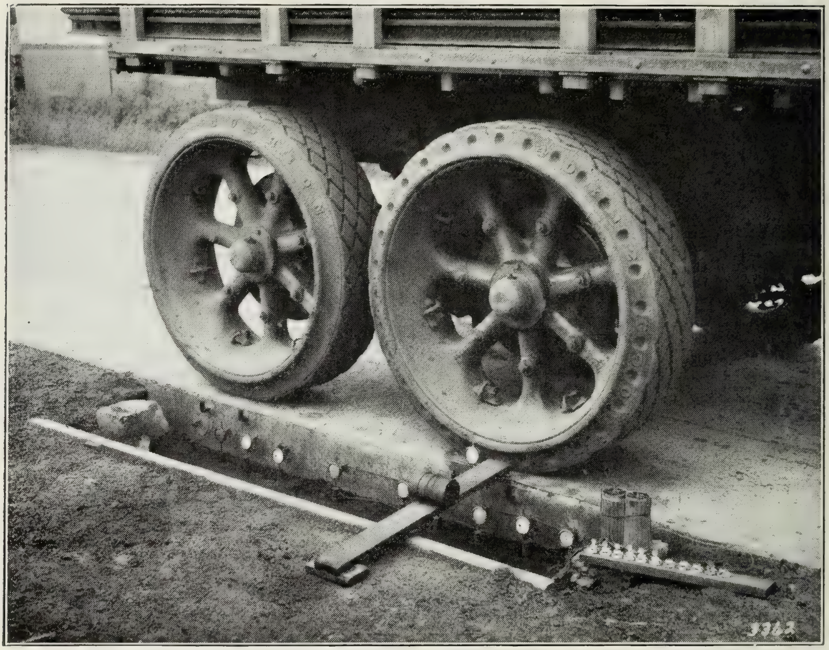

Figure 82.—Apparatus used to measure fibre deformations and deflections of pavement.

a. Photographic.—The photographic section secured records of road improvement, made reproductions of maps, reports, and other data for the Bureaus and Districts where the use of photographs was considered advisable. Many of these records have been used in legal cases where exact duplicates of the original are necessary. An index of all the films on file, and sample books containing pictures of construction scenes from the various districts have been prepared to facilitate ordering prints.

Table XXXVIII shows the number of films, prints and slides prepared for the various Bureaus:

TABLE XXXVIII—NUMBER OF FILMS, PRINTS AND SLIDES PREPARED FOR THE VARIOUS BUREAUS DURING 1927.

	Films.	Prints.	Slides.
Highway Executive Office*	1	114	3
Bureau of Audits	44	212	0
Bureau of Construction	74	3563	0
Bureau of Design	169	2341	0
Bureau of Maintenance	25	483	0
Bureau of Materials	276	**2405	12
District No. 1	0	70	0
District No. 2	26	26	0
District No. 3	0	141	0
District No. 4	18	46	0
District No. 5	28	63	0
District No. 6	1	393	0
District No. 8	0	18	0
Exhibits	0	80	0
Total	662	9,955	15

* Also repaired 48 reels for moving picture machine.

** Includes 1,534 kodak prints of jetting views. This work conducted in co-operation with the Bureau of Construction.

b. Mechanical Service.—Some of the services rendered by this section were:

(1) The calibrating and repairing of portable scales used by the highway patrol officers.

(2) The construction and repairing of highway exhibits which were sent to the various county fairs.

(3) The construction of mechanical apparatus used in the highway research and investigations.

(4) The construction and repair of various kinds of equipment.

c. Paint for Construction and Maintenance.—This Bureau inspects, stores and distributes paint for the construction and maintenance departments.

By centralizing the handling of this paint, considerably lower prices have been secured due to the paint being purchased in carload lots. Also the cost of inspection has been greatly reduced. Inspection at the manufacturing plant eliminates the necessity of conducting inspection on individual shipments for each particular section of work.

Table XXXIX shows the quantity of paint distributed during the calendar year 1927:

TABLE XXXIX—PAINT HANDLED BY BUREAU OF MATERIALS DURING THE CALENDAR YEAR 1927.

Inventory.		Inventory, gallons.
On hand January 1, 1927		
Sublimed blue lead paint	2,248¾ Gals.	
White lead paint	620 Gals.	
Highway yellow paint	940 Gals.	
Total		3,808¾
Received during year 1927—		
Sublimed blue lead paint	11,460 Gals.	
White lead paint	18,195 Gals.	
Stencil paint	179 Gals.	
Total		29,834
		33,642¾

Account.	Paint furnished—gallons.				
	Stencil paint.	Sublimed blue lead paint.	White lead paint.	Highway yellow paint.	
Lost in transit—claim filed with railroad company			6		
Furnished free to contractors in accordance with terms of contracts		6,837	1,871		
Charged to contractors, account used in excess of maximum amount allowed by contract		177	118		
Furnished for miscellaneous State Work, paint paid for by contractor		118	26		
Furnished for township and county work, paint paid for by county or contractor		1,099½	665		
Bureau of Construction—					
General		6			
Day Labor		340	705		
Bureau of Design			3¼		
Bureau of Machinery			3		
Bureau of Maintenance—					
District No. 1	37	125	450	150	
District No. 2	6		550	75	
District No. 3	22	50	1,225	80	
District No. 4	37	100	775	100	
District No. 5	32	100	650	50	
District No. 6	12	50	855	125	
District No. 7	11	50	1,600	100	
District No. 8	6	25	1,475		
District No. 9	16		1,665	110	
Bureau of Materials		11¼	96¾		
Department of Agriculture			155		
Total	179	9,088¾	12,894	790	
Less paint furnished during 1927					22,951¾
On hand January 1, 1928—					
Sublimed blue lead paint 4,620 gals.					
White lead paint 5,921 gals.					
Highway yellow paint 150 gals.					
Balance					10,691

VI. BUREAU OF AUDITS.

1. ACCOUNTING AND AUDITING.—The total expenditure of the Division of Highways for 1927 was $24,684,106.29 covered by 58,219 vouchers. During 1927 administration and engineering records were placed on a cost basis with the result that comparisons of the costs of the various units of the organization can be made. The accounting system has been perfected in many respects and all records are being placed under the double entry system of accounting. A general control ledger is being established which will make it possible to determine the accuracy of the records kept by the various sections of this Bureau.

The following statement represents the collections of the Division of Highways and the sources from which they were collected during the calendar year 1927:

TABLE XL—STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS AND SOURCES FROM WHICH COLLECTED, FROM JANUARY 1, 1927, TO DECEMBER 31, 1927.

Month.	Administration.	Engineering.	Tests.	Construction refunds.	Maintenance refunds.	Equipment rentals and sales.	Total.
January	$2.00	$54.28	$310.43	$3,120.98	$1,545.28	$577.62	$5,610.59
February	----------	----------	324.46	648.67	4,518.02	918.70	6,409.85
March	14.00	114.35	3,647.29	251.26	1,789.97	870.23	6,687.10
April	----------	299.00	4,878.42	23,564.05	2,480.75	----------	31,222.22
May	153.26	5.00	215.30	7,270.80	1,132.33	2,534.60	11,311.29
June	10.50	16.13	906.22	1,515.63	3,100.31	3,050.44	8,599.23
July	4.00	29.17	250.89	1,707.13	681.82	4,764.69	7,437.70
August	9,73	----------	1,983.61	6,294.90	788.72	461.40	9,538.36
September	17.36	138.40	450.85	12,102.31	11,146.11	----------	23,855.03
October	190.82	34.91	885.48	10,907.18	10,833.76	1,879.30	24,731.45
November	214.53	115.80	402.28	30,188.95	3,868.19	----------	34,789.75
December	42.66	----------	399.45	22,422.09	5,301.10	2,373.73	30,539.03
Total	$658.86	$807.04	$14,654.68	$119,993.95	$47,186.36	$17,430.71	$200,731.60

2. REPORTS AND FINANCIAL STATEMENTS.—In the following pages will be found financial and statistical statements relating to the work of the Division.

The following graph shows a division of all revenues by funds for the calendar years 1911 to 1927, inclusive:

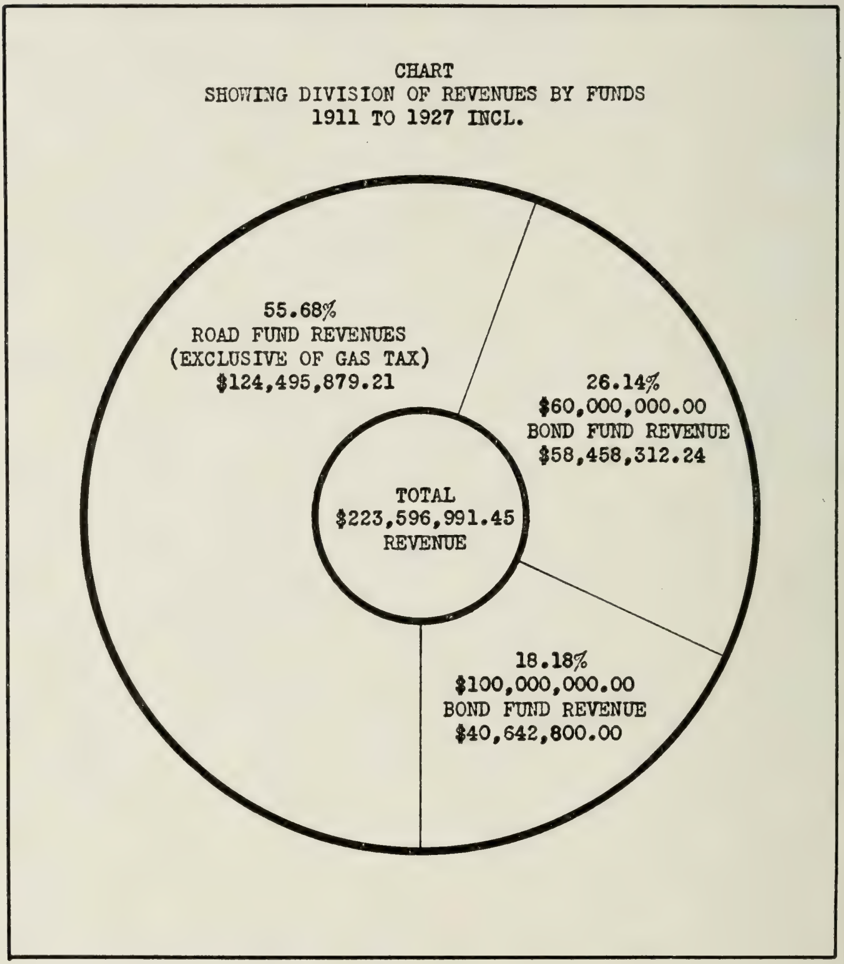

Figure 83.

The following graph shows the division of the combined expenditures from the Road Fund, $60,000,000.00 and $100,000,000.00 Bond Fund from 1914 to 1927, inclusive:

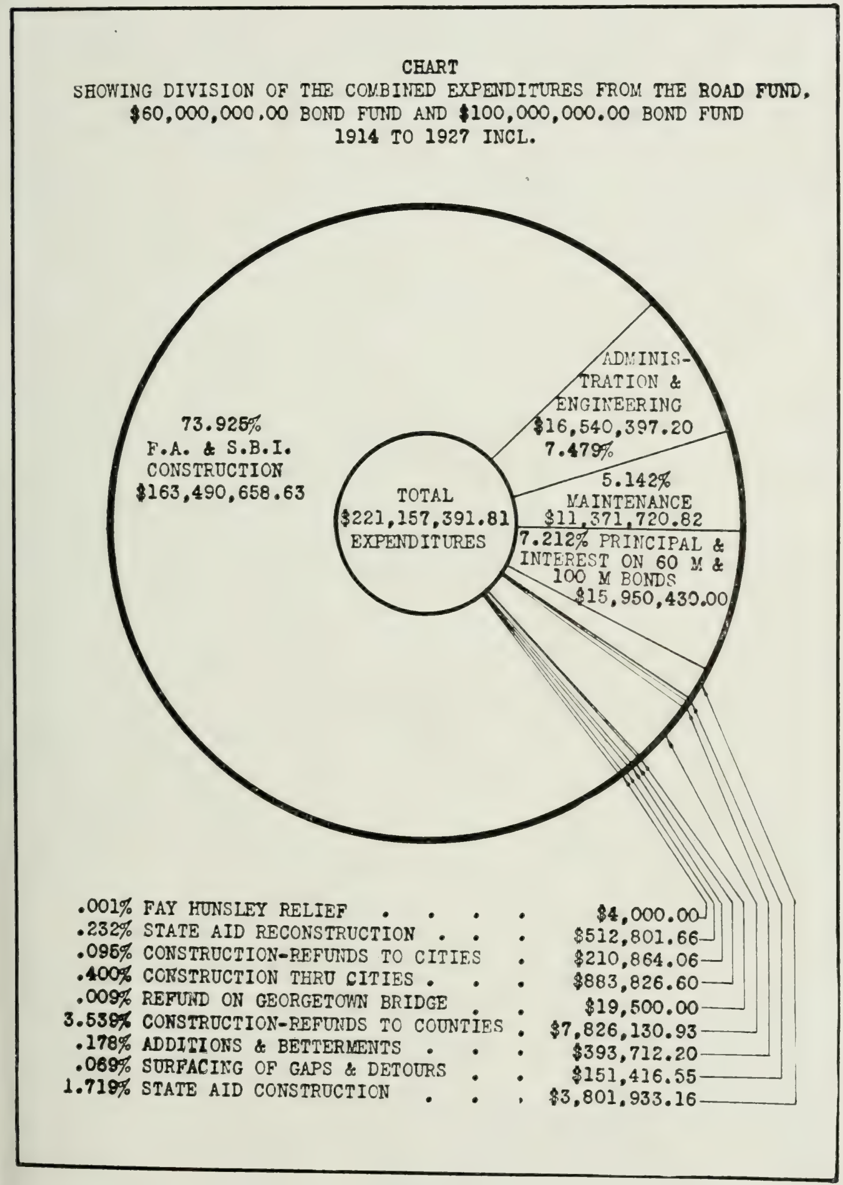

Figure 84.

The following statement represents the revenue which has been deposited in the Road Fund for the years 1911 to 1927, inclusive, and shows a comparison of the amounts collected for the years 1921 to 1927, inclusive, against previous years collections:

TABLE XLI—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Gas tax.	Total.
1911	$ 74,552.59				$ 74,552.59
1912	364,708.03				364,708.03
1913	499,802.45				499,802.45
1914	700,233.00				700,233.00
1915	903,284.09				903,284.09
1916	1,238,483.92				1,238,483.92
1917	1,629,445.26				1,629,445.26
1918	2,770,084.60		$ 85.00		2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50		3,765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68		11,111,995.56
Sub-total	$17,273,087.13	$5,724,799.05	$60,390.18		$23,058,276.36
1921	$ 6,862,125.83	$ 3,802,430.46	$221,645.55		$10,886,201.84
1922	7,904,219.71	1,733,334.86	132,495.77		9,770,050.34
1923	9,689,702.77	4,257,276.06	135,485.61		14,082,464.44
1924	11,557,838.94	3,565,058.69	300,045.58		15,422,943.21
1925	13,050,977.39	2,717,923.43	514,260.69		16,283,161.51
1926	13,937,579.64	2,036,921.95	214,330.36		16,188,831.95
1927	15,589,365.19	2,997,912.78	216,671.59	$3,953,047.72	22,756,997.28
Sub-total	$78,591,809.47	$21,110,858.23	$1,734,935.15	$3,953,047.72	$105,390,650.57
Grand total	$95,864,896.60	$26,835,657.28	$1,795,325.33	$3,953,047.72	$128,448,926.93

The following graph shows a division of Road Fund Revenues, exclusive of gasoline tax funds, from 1911 to 1927, inclusive:

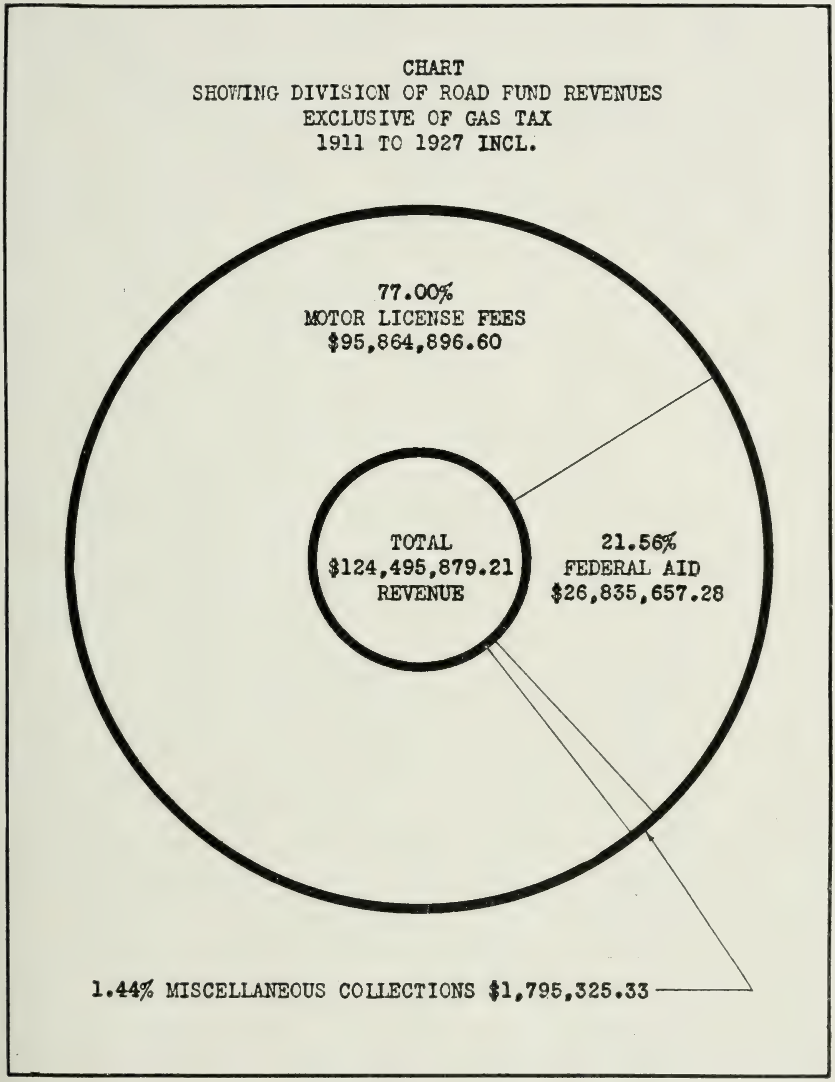

Figure 85.

The following statement represents the appropriations which have been made by the General Assembly from the Road Fund since 1913:

TABLE XLII—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For maintenance.	For State highways.	For county refunds.	For cement plant.	For Fay Hunsley relief.
1913	$ 400,000.00						
1914	700,000.00						
1915	1,000,000.00						
1916	1,000,000.00						
1917	1,200,000.00	$1,326,000.00					
1919	500,000.00	26,600,000.00					
1921			$3,000,000.00	$20,000,000.00	$3,889,382.23	$5,000,000.00	$4,000.00
1923			3,000,000.00	20,000,000.00	4,025,632.56	5,000,000.00	
1925			6,000,000.00	35,000,000.00	2,704,818.95	5,000,000.00	
1927			6,000,000.00	27,000,000.00	3,000,000.00	5,000,000.00	
Total	$4,800,000.00	$27,926,000.00	$18,000,000.00	$102,000,000.00	$13,619,833.74	$20,000,000.00	$4,000.00

TABLE XLII—Concluded.

Year.	For gravel plant.	Principal and interest on highway bonds.	Refunds to municipalities.	Construction through municipalities.	Bridge at Mt. Carmel.	Refund on Georgetown bridge.	Total.
1913							$ 400,000.00
1914							700,000.00
1915							1,000,000.00
1916							1,000,000.00
1917							2,526,000.00
1919	$125,000.00						27,225,000.00
1921		$ 1,000,000.00					32,893,382.23
1923		4,000,000.00					36,025,632.56
1925		12,320,000.00	$300,000.00	$1,000,000.00			62,324,818.95
1927		13,854,420.00	300,000.00	500,000.00	$225,000.00	$19,500.00	55,898,920.00
Total	$125,000.00	$31,174,420.00	$600,000.00	$1,500,000.00	$225,000.00	$19,500.00	$219,993,753.74

The following statement represents the expenditures made from the Road Fund during the years 1914 to 1927, inclusive, and shows a comparison of the amounts expended during the years 1921 to 1927, inclusive, as compared with previous years:

TABLE XLIII—EXPENDITURES FROM THE ROAD FUND—1914 TO 1927.

Year.	Administration and engineering.	State aid construction.	State aid reconstruction.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.	Additions and betterments.	Maintenance.
1914		$364,202.39					
1915	$ 22,128.34	630,612.30					$ 14,657.73
1916	3,920.88	656,641.05					17,125.25
1917	113,318.90	992,754.54					34,307.21
1918	21,896.36	334,224.06		$ 190,578.78			37,303.98
1919	568,099.29	441,060.76		3,882,213.47			84,614.37
1920	1,054,178.76	209,286.41		10,109,977.55			208,802.55
Sub-total	$1,783,542.53	$3,628,781.51		$14,182,769.80			$396,811.09
1921	$ 966,262.64	$115,104.51		$10,966,994.05			$ 358,658.85
1922	575,440.81	32,768.68		6,262,162.56			640,503.01
1923	1,146,967.70	25,278.46		8,087,246.99			1,110,034.41
1924	1,164,610.99		$ 619.92	11,306,557.30	$15,869.98	$35,123.82	2,044,860.69
1925	647,380.34		263.24	8,540,968.85	30,065.42	50,791.99	1,834,637.74
1926	1,010,249.17		20,021.35	7,529,889.74	17,044.83	52,844.88	2,264,770.58
1927	986,149.46		491,897.15	7,684,245.51	14,519.21	81,729.73	2,721,444.45
Sub-total	$6,497,061.11	$173,151.65	$512,801.66	$60,378,065.00	$77,499.44	$220,490.42	$10,974,909.73
Total	$8,280,603.64	$3,801,933.16	$512,801.66	$74,560,834.80	$77,499.44	$220,490.42	$11,371,720.82

TABLE XLIII—Concluded.

Year.	Refunds to counties.	Refund on Georgetown bridge.	Fay Hunsley relief.	Interest and principal on 60m and 100m bonds.	Construction through municipalities.	Refunds to municipalities.	Total.
1914							$ 364,202.39
1915							667,398.37
1916							677,687.18
1917							1,140,380.65
1918							584,003.18
1919							4,975,987.89
1920							11,582,245.27
Sub-total							$19,991,904.93
1921	$ 719,273.18		$4,000.00				$13,130,293.23
1922	1,798,184.50			$ 96,120.00			9,405,179.56
1923	1,411,337.49			661,340.00			12,442,205.05
1924	1,176,893.14			1,388,813.35			17,133,349.19
1925	602,050.80			2,687,303.72	$ 19,592.59		14,413,054.69
1926	499,200.93			5,510,843.18	538,374.33		17,443,238.99
1927	368,187.25	$19,500.00		5,606,009.75	325,859.68	$210,864.06	18,510,406.25
Sub-total	$6,575,127.29	$19,500.00	$4,000.00	$15,950,430.00	$883,826.60	$210,864.06	$102,477,726.96
Total	$6,575,127.29	$19,500.00	$4,000.00	$15,950,430.00	$883,826.60	$210,864.06	$122,469,631.89

The following graph shows a division of expenditures made from the Road Fund during the calendar years 1914 to 1927 inclusive:

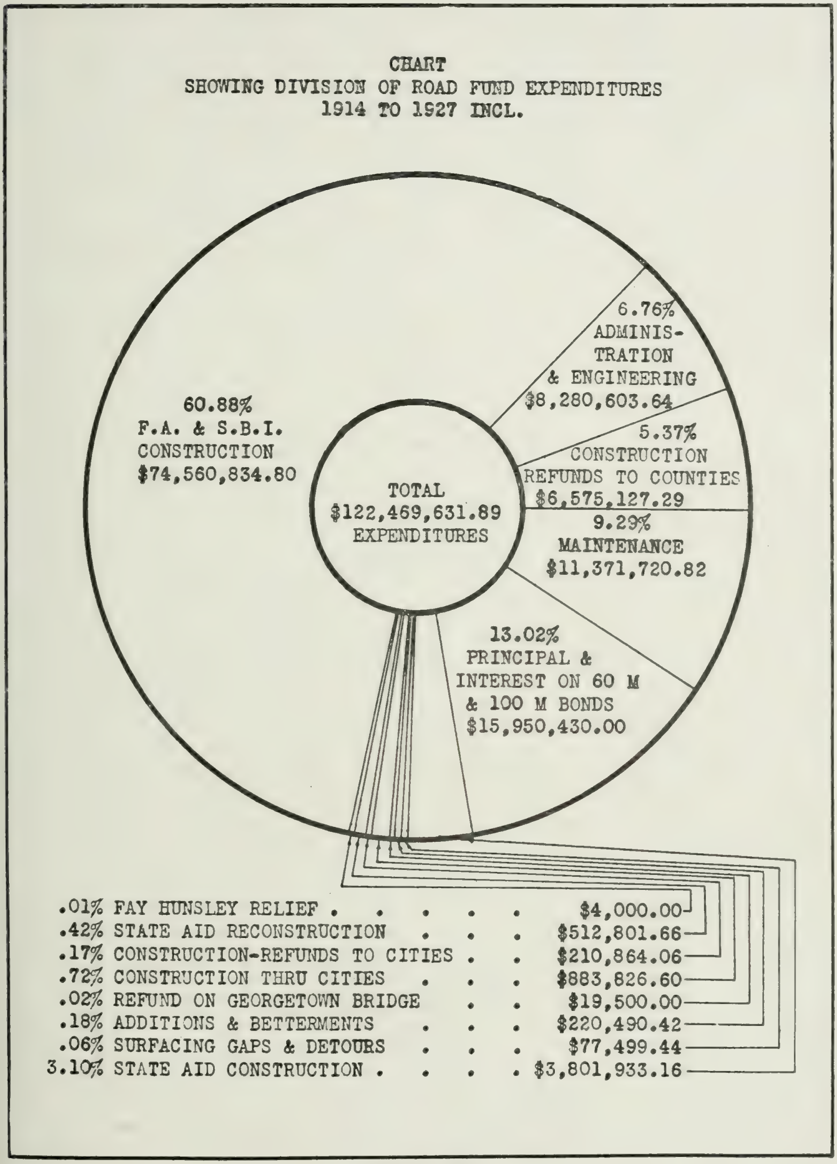

CHART
SHOWING DIVISION OF ROAD FUND EXPENDITURES
1914 TO 1927 INCL.

Figure 86.

The following statement represents the collection of motor license fees by the Secretary of State and shows the number of vehicles from which the collections were made during the calendar years 1911 to 1927, inclusive:

TABLE XLIV—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Year of collection.	Number of vehicles.	Fees collected.
1911	38,269	$ 105,344.28
1912	68,012	375,716.22
1913	94,646	507,134.77
1914	131,140	703,403.70
1915	180,832	924,905.74
1916	248,429	1,242,509.65
1917	340,252	1,587,772.69
1918	389,761	2,762,567.53
1919	478,438	3,262,176.57
1920	568,759	5,893,586.02
1921	670,452	6,663,910.22
1922	785,378	7,861,211.21
1923	969,092	9,630,367.77
1924	1,132,641	11,513,957.05
1925	1,267,734	12,936,882.13
1926	1,375,191	14,047,207.86
1927	1,443,579	14,839,593.29
Total 1911 to 1927		$94,858,246.70

NOTE.—This statement represents the collection of motor fees by calendar years as made by the Secretary of State's office and can not be compared with the revenue deposited with the State Treasurer due to the fact that the law requires the Secretary of State to deposit his collections each thirty days following date of receipt.

The following statement represents the collection of motor license fees by months during the calendar years 1924, 1925, 1926 and 1927:

TABLE XLV—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

	1924	1925	1926	1927
January	$5,542,566.42	$5,952,896.84	$6,572,605.72	$6,818,923.22
February	1,800,877.12	2,355,086.26	2,526,795.92	3,026,301.85
March	1,203,696.55	1,480,242.01	1,757,830.67	2,103,205.27
April	1,109,041.92	1,241,706.96	925,950.19	897,990.62
May	672,716.70	599,550.75	800,539.64	679,154.38
June	335,451.15	370,950.36	430,240.42	391,463.70
July	351,320.94	378,403.54	434,947.22	384,748.73
August	192,873.25	219,491.73	258,046.32	226,755.11
September	137,691.72	159,867.43	168,085.08	147,037.12
October	106,516.39	108,431.17	102,286.57	95,761.15
November	47,113.75	50,544.89	52,548.86	53,286.00
December	14,091.14	19,710.19	17,331.25	14,966.14
Total	$11,513,957.05	$12,936,882.13	$14,047,207.86	$14,839,593.29

The following statement represents the collection of motor license fees by counties during the calendar years 1924, 1925, 1926 and 1927:

TABLE XLVI—SCHEDULE OF MOTOR FEES BY COUNTIES AS COLLECTED BY SECRETARY OF STATE.

	1924	1925	1926	1927
Cook	$4,146,998.00	$4,788,890.00	$5,286,139.00	$5,778,102.00
Adams	131,363.00	143,670.00	152,420.00	163,211.00
Alexander	28,418.00	32,750.00	36,390.00	35,334.00
Bond	31,215.00	33,568.00	36,830.00	36,490.00
Boone	37,595.00	42,090.00	44,010.00	44,666.00
Brown	17,100.00	18,674.00	20,950.00	19,719.00
Bureau	104,925.00	113,090.00	117,520.00	119,830.00
Calhoun	12,110.00	13,956.00	14,752.00	14,773.00
Carroll	49,942.00	52,201.00	56,375.00	58,944.00
Cass	40,101.00	47,299.00	46,990.00	44,378.00
Champaign	163,098.00	196,100.00	187,333.00	189,312.00
Christian	80,393.00	93,993.00	98,844.00	99,700.00
Clark	44,928.00	49,238.00	51,835.00	53,447.00
Clay	23,818.00	31,675.00	35,287.00	34,363.00
Clinton	35,991.00	41,410.00	44,540.00	47,158.00
Coles	77,512.00	83,698.00	89,826.00	92,171.00
Crawford	56,980.00	63,612.00	67,358.00	71,722.00
Cumberland	21,001.00	23,091.00	24,449.00	24,175.00
DeKalb	90,185.00	98,277.00	103,242.00	107,814.00
DeWitt	44,044.00	48,170.00	47,766.00	47,273.00
Douglas	46,860.00	48,314.00	51,035.00	50,771.00
DuPage	131,091.00	162,200.00	191,933.00	221,230.00
Edgar	60,358.00	66,799.00	70,861.00	70,711.00
Edwards	17,611.00	21,303.00	24,144.00	24,790.00
Effingham	36,984.00	43,612.00	46,537.00	48,055.00
Fayette	32,130.00	38,998.00	44,370.00	45,438.00
Ford	44,050.00	47,856.00	49,744.00	49,184.00
Franklin	105,513.00	120,910.00	122,890.00	125,990.00
Fulton	109,841.00	116,795.00	119,871.00	116,588.00
Gallatin	12,480.00	17,308.00	18,930.00	18,405.00
Greene	37,900.00	43,610.00	47,111.00	46,231.00
Grundy	43,222.00	46,882.00	51,643.00	52,109.00
Hamilton	13,481.00	17,600.00	19,945.00	18,980.00
Hancock	74,585.00	79,145.00	81,646.00	79,715.00
Hardin	5,635.00	7,610.00	7,644.00	7,782.00
Henderson	19,759.00	22,020.00	22,477.00	21,241.00
Henry	118,853.00	127,015.00	132,830.00	138,506.00
Iroquois	92,250.00	99,111.00	102,674.00	102,855.00
Jackson	63,500.00	71,600.00	79,011.00	77,890.00
Jasper	23,867.00	27,840.00	29,310.00	28,799.00
Jefferson	46,914.00	59,913.00	61,822.00	61,423.00
Jersey	19,001.00	23,010.00	25,380.00	25,088.00
JoDaviess	48,196.00	52,676.00	58,212.00	61,800.00
Johnson	12,020.00	16,222.00	18,079.00	17,212.00
Kane	237,250.00	264,120.00	296,115.00	329,060.00
Kankakee	102,070.00	111,680.00	114,200.00	119,211.00
Kendall	26,760.00	30,091.00	32,800.00	33,225.00
Knox	117,583.00	128,188.00	135,366.00	137,388.00
Lake	164,874.00	189,660.00	216,760.00	247,950.00
LaSalle	203,732.00	226,655.00	238,399.00	248,831.00
Lawrence	47,438.00	51,430.00	57,500.00	58,209.00
Lee	81,695.00	88,127.00	95,290.00	98,833.00
Livingston	96,643.00	105,951.00	108,964.00	108,366.00
Logan	65,268.00	70,745.00	72,866.00	70,827.00
Macon	152,421.00	177,140.00	190,187.00	207,012.00
Macoupin	101,125.00	111,684.00	113,950.00	114,328.00
Madison	219,872.00	251,480.00	282,570.00	302,770.00
Marion	69,952.00	76,391.00	83,693.00	92,601.00
Marshall	31,389.00	33,836.00	35,456.00	34,085.00
Mason	43,784.00	46,984.00	49,670.00	46,890.00
Massac	16,587.00	19,156.00	19,377.00	20,644.00
McDonough	68,457.00	74,280.00	78,900.00	78,633.00
McHenry	94,563.00	101,998.00	109,631.00	119,250.00
McLean	176,324.00	194,757.00	197,611.00	198,342.00
Menard	26,839.00	29,800.00	30,713.00	29,396.00
Mercer	51,215.00	52,350.00	53,722.00	53,089.00
Monroe	25,777.00	28,675.00	32,040.00	33,299.00
Montgomery	81,897.00	85,582.00	87,166.00	86,104.00
Morgan	63,690.00	69,988.00	78,040.00	78,110.00
Moultrie	27,829.00	31,812.00	33,468.00	32,817.00
Ogle	80,357.00	83,751.00	88,940.00	91,180.00
Peoria	271,726.00	288,980.00	303,012.00	318,096.00
Perry	40,952.00	43,333.00	46,566.00	46,592.00
Piatt	41,620.00	44,989.00	46,911.00	48,230.00
Pike	47,325.00	54,211.00	59,683.00	58,425.00

TABLE XLVI—Concluded.

	1924	1925	1926	1927
Pope	$ 5,766.00	$ 8,985.00	$ 9,740.00	$ 9,415.00
Pulaski	17,252.00	19,691.00	22,299.00	22,081.00
Putnam	13,785.00	14,383.00	15,390.00	15,200.00
Randolph	51,632.00	55,812.00	60,522.00	62,166.00
Richland	27,501.00	32,618.00	36,591.00	38,130.00
Rock Island	189,946.00	202,866.00	220,141.00	233,691.00
Saline	63,669.00	69,688.00	69,350.00	69,200.00
Sangamon	206,024.00	232,480.00	244,200.00	251,157.00
Schuyler	26,913.00	28,455.00	29,688.00	27,710.00
Scott	19,769.00	22,892.00	24,411.00	23,250.00
Shelby	53,446.00	61,860.00	65,855.00	65,411.00
Stark	29,299.00	31,156.00	33,310.00	31,619.00
St. Clair	255,653.00	282,399.00	301,232.00	326,795.00
Stephenson	98,632.00	105,896.00	112,340.00	119,754.00
Tazewell	80,154.00	92,570.00	96,834.00	100,177.00
Union	28,182.00	33,682.00	36,377.00	36,146.00
Vermilion	185,204.00	203,474.00	208,911.00	212,200.00
Wabash	24,423.00	28,580.00	33,360.00	32,190.00
Warren	64,445.00	67,913.00	73,988.00	71,329.00
Washington	32,677.00	35,618.00	39,142.00	40,212.00
Wayne	26,328.00	32,415.00	36,500.00	35,715.00
White	26,513.00	33,830.00	38,050.00	37,450.00
Whiteside	108,669.00	117,170.00	124,371.00	129,899.00
Will	199,882.00	201,864.00	235,100.00	249,113.00
Williamson	116,409.00	117,111.00	120,401.00	123,621.00
Winnebago	209,671.00	216,980.00	267,950.00	289,970.00
Woodford	53,530.25	57,741.00	60,633.86	59,824.29
Total	$11,546,206.25	$12,969,754.00	$14,047,207.86	$14,839,593.29
Less refunds	32,249.20	32,871.87	----------	----------
Balance	$11,513,957.05	$12,936,882.13	$14,047,207.86	$14,839,593.29

The following statement represents the allotment of Federal Aid Funds by the U. S. Government to Illinois for the calendar years 1917 to 1929, inclusive:

TABLE XLVII—STATEMENT OF FEDERAL AID FUNDS ALLOTTED BY THE U. S. GOVERNMENT TO ILLINOIS 1917 TO 1929 INCLUSIVE.

	Amount.
Fiscal Year Ending June 30, 1917	$ 220,926.23
Fiscal Year Ending June 30, 1918	441,852.46
Fiscal Year Ending June 30, 1919	2,185,550.65
Fiscal Year Ending June 30, 1919	658,323.48
Fiscal Year Ending June 30, 1920	874,220.26
Fiscal Year Ending June 30, 1920	3,278,325.98
Fiscal Year Ending June 30, 1921	1,091,266.98
Fiscal Year Ending June 30, 1921	3,273,800.93
Fiscal Year Ending June 30, 1922	3,246,281.07
Fiscal Year Ending June 30, 1923	2,164,187.38
Fiscal Year Ending June 30, 1923 Reapportioned	28,611.00
Fiscal Year Ending June 30, 1924	2,797,888.59
Fiscal Year Ending June 30, 1925	3,203,867.99
Fiscal Year Endng June 30, 1926	3,191,479.00
Fiscal Year Ending June 30, 1927	3,175,616.00
Fiscal Year Ending June 30, 1928	3,154,429.00
Fiscal Year Ending June 30, 1929	3,135,225.00
	$36,121,852.00

The following statement represents the revenue derived from the sale of the $60,000,000.00 Bond Issue and shows the weighted average sale rate together with the weighted average yield on all series sold:

TABLE XLVIII—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $60,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	94.020	4.83	$5,000,000.00	$4,709,477.78	$4,709,477.78	----------
1922	Apr. 13	98.875	4.19	6,000,000.00	5,940,111.11	5,940,111.11	----------
1922	Sept. 18	99.688	4.04	6,000,000.00	6,083,855.65	6,083,855.65	----------
1923	Feb. 20	98.183	4.15	6,000,000.00	5,908,333.34	5,908,333.34	----------
1923	May 25	97.000	4.40	7,000,000.00	6,837,667.68	6,837,667.68	----------
1922	Oct. 16	94.41	4.68	6,000,000.00	5,687,266.68	5,687,266.68	----------
1923	Dec. 22	94.46	4.50	6,000,000.00	5,678,266.67	5,667,600.00	$10,666.67
1924	June 3	96.525	4.29	9,000,000.00	8,704,200.00	8,704,200.00	----------
1924	Aug. 15	99.109	4.08	9,000,000.00	8,947,800.00	8,919,800.00	28,000.00
Total	----------	97.4949	4.32	$60,000,000.00	$58,496,978.91	$58,458,312.24	$38,666.67

NOTE.—The figure of 4.32 shown under Interest Yield represents the weighted average yield of all series sold.

The figure of 97.4949 shown in the sale rate column represents the average sale rate on all series sold.

The following statement represents the appropriations made by the General Assembly from the $60,000,000.00 Bond Issue Fund:

TABLE XLIX—APPROPRIATIONS PAYABLE FROM $60,000,000.00 BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922	----------	----------	----------
1923	30,000,000.00	----------	30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

The following statement represents the expenditures which have been made from the $60,000,000.00 Bond Issue Fund for the calendar years 1921 to 1924, inclusive:

TABLE L—EXPENDITURES FROM $60,000,000.00 BOND ISSUE FUND 1921 TO 1924.

Year.	Administration and engineering.	Federal aid and S. B. I. construction.	Refunds to counties.	Total.
1921	$ 264,586.27	$ 2,196.414.38	$ 8,000.00	$ 2,469,000.65
1922	1,159,056.12	11,261,655.37	637,820.93	13,058,532.42
1923	1,138,767.61	17,469,029.10	605,182.71	19,212,979.42
1924	1,656,489.24	22,061,310.51	----------	23,717,799.75
Total	$4,218,899.24	$52,988,409.36	$1,251,003.64	$58,458,312.24

The following graph shows the proceeds of sales of the $60,000,000.00 Bond Issue together with the amounts sold, arranged by years, 1921 to 1924, inclusive:

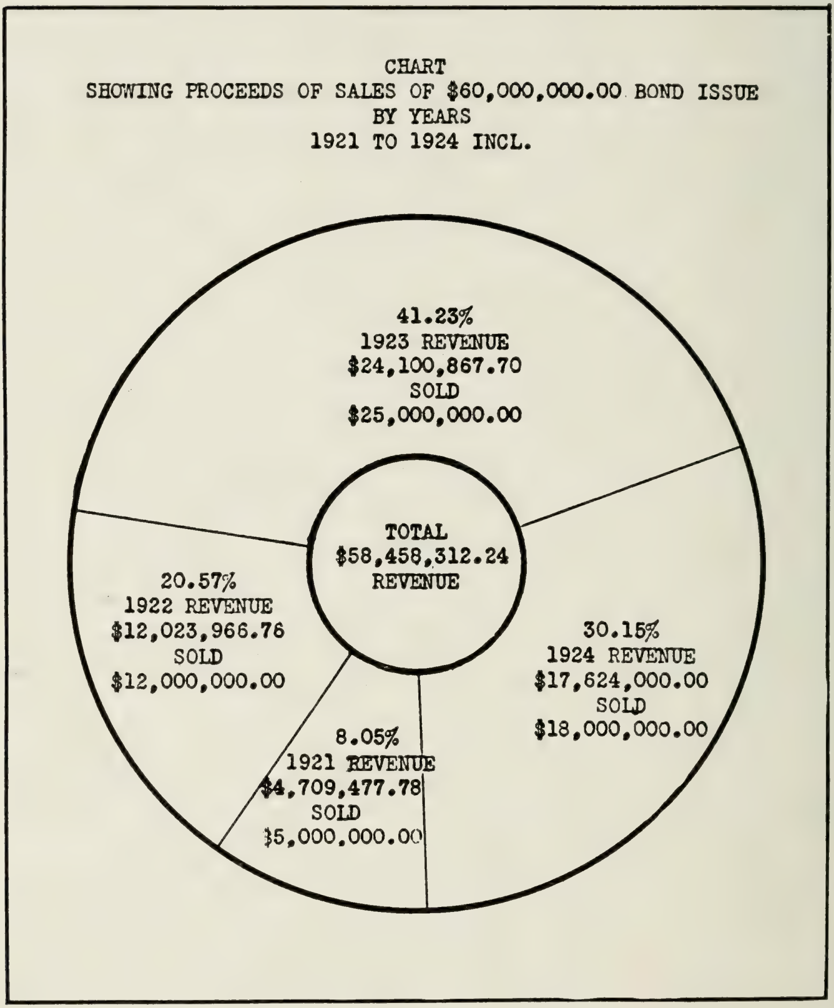

Figure 87.

The following graph shows the division of expenditures of the funds derived from the sale of the $60,000,000.00 Bond Issue from 1921 to 1924, inclusive:

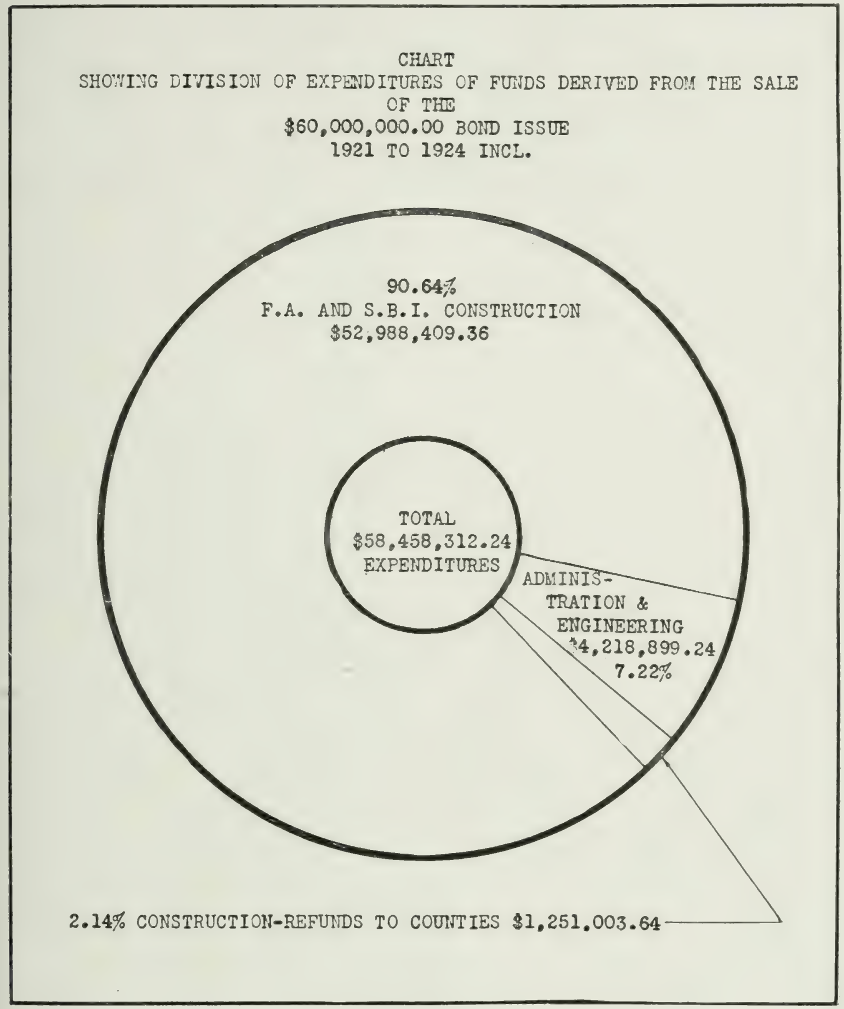

Figure 88.

The following statements represent the arrangement of the retirement of the principal and payment of interest on all series of the $60,000,000.00 Bond Issue which was voted November 4, 1918:

TABLE LI—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $60,000,000.00—4% BONDS.

Total Bond Voted November 4, 1918 ---- $60,000,000.00

Total Bond Authorized for Sale ---- $60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each year.
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		2,160,000.00	2,160,000.00	4,320,000.00
1926	$2,000,000.00	2,400,000.00	4,400,000.00	8,720,000.00
1927	2,000,000.00	2,320,000.00	4,320,000.00	13,040,000.00
1928	2,000,000.00	2,240,000.00	4,240,000.00	17,280,000.00
1929	2,000,000.00	2,160,000.00	4,160,000.00	21,440,000.00
1930	2,000,000.00	2,080,000.00	4,080,000.00	25,520,000.00
1931	2,000,000.00	2,000,000.00	4,000,000.00	29,520,000.00
1932	2,000,000.00	1,920,000.00	3,920,000.00	33,440,000.00
1933	2,000,000.00	1,840,000.00	3,840,000.00	37,280,000.00
1934	2,000,000.00	1,760,000.00	3,760,000.00	41,040,000.00
1935	3,000,000.00	1,680,000.00	4,680,000.00	45,720,000.00
1936	3,000,000.00	1,560,000.00	4,560,000.00	50,280,000.00
1937	3,000,000.00	1,440,000.00	4,440,000.00	54,720,000.00
1938	4,000,000.00	1,320,000.00	5,320,000.00	60,040,000.00
1939	4,000,000.00	1,160,000.00	5,160,000.00	65,200,000.00
1940	5,000,000.00	1,000,000.00	6,000,000.00	71,200,000.00
1941	5,000,000.00	800,000.00	5,800,000.00	77,000,000.00
1942	5,000,000.00	600,000.00	5,600,000.00	82,600,000.00
1943	5,000,000.00	400,000.00	5,400,000.00	88,000.000.00
1944	5,000,000.00	200,000.00	5,200,000.00	93,200,000.00
Total	$60,000,000.00	$33,200,000.00	$93,200,000.00	$93,200,000.00

TABLE LII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sale—Oct. 25, 1921. Date of issue—Nov. 1, 1921. Rate $94.020. Yield $4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1. each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE LIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES No. 2—$6,000,000.00—4% BONDS.

Date of sale—April 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1. each year.	Total this issue payable at May 1. each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE LIV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue May 1, 1922. Rate $99.688. Yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1. each year.	Total this issue payable at May 1. each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000,00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000.000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE LV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—Mar. 1, 1923. Rate $98.183. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1. each year.	Accumulative total this issue payable to May 1 each year.
1924		$240,000.00	$ 240,000.00	$ 240,000.00
1925		240,000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1933		240,000.00	240,000.00	2,400,000.00
1934		240,000.00	240,000.00	2,640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120,000.00
1937		240,000.00	240,000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000,000.00	160,000.00	1,160,000.00	6,960.000,00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	9,160,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE LVI—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Yield 4.40.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	$ 500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220,000.00	720,000.00	3,560,000.00
1930	500,000.00	200,000.00	700,000.00	4,260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600.000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1,000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40,000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE LVII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16. 1923. Date of issue—Oct. 1, 1923. Rate $94.41. Yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580,000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE LVIII—$60,000,000.00—BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1929		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

TABLE LIX—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 8—$9,000,000.00—4% BONDS.

Date of sale—June 3, 1924. Date of issue—June 1, 1924. Rate $96.525. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$270,000.00	$270,000.00	$270,000.00
1926		360,000.00	360,000.00	630,000.00
1927		360,000.00	360,000.00	990,000.00
1928		360,000.00	360,000.00	1,360,000.00
1929		360,000.00	360,000.00	1,710.000.00
1930		360,000.00	360,000.00	2,070.000.00
1931		360,000.00	360,000.00	2,430,000.00
1932		360,000.00	360,000.00	2,790,000.00
1933		360,000.00	360,000.00	3,150,000.00
1934		360,000.00	360,000.00	3,510,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,370,000.00
1936	500,000.00	340,000.00	840,000.00	5,210,000.00
1937		320,000.00	320,000.00	5,530,000.00
1938		320,000.00	320,000.00	5,850,000.00
1939		320,000.00	320,000.00	6,170,000.00
1940	1,000,000.00	320,000.00	1,320,000.00	7,490,000.00
1941	1,000,000.00	280,000.00	1,280,000.00	8,770,000.00
1942	2.000,000.00	240,000.00	2,240,000.00	11,010,000.00
1943	2,000,000.00	160,000.00	2,160,000.00	13,170,000.00
1944	2,000,000.00	80,000.00	2,080,000.00	15,250,000.00
Total	$9,000,000.00	$6,250,000.00	$15,250,000.00	$15,250,000.00

TABLE LX—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—Aug. 15, 1924. Date of issue—Aug. 1, 1924. Rate $99.109. Yield 4.08.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$210,000.00	$ 210,000.00	$ 210,000.00
1926		360,000.00	360,000.00	570,000.00
1927		360,000.00	360,000.00	930,000.00
1928		360,000.00	360,000.00	1,290,000.00
1929		360,000.00	360,000.00	1,650,000.00
1930		360,000.00	360,000.00	2,010,000.00
1931		360,000.00	360,000.00	2,370,000.00
1932		360,000.00	360,000.00	2,730,000.00
1923		360,000.00	360,000.00	3,090,000.00
1934		360,000.00	360,000.00	3,450,000.00
1935	$ 500,000,00	360,000.00	860,000.00	4,310,000.00
1936	500,000.00	340,000.00	840,000.00	5,150,000.00
1937		320,000.00	320,000.00	5,470,000.00
1938	1,000,000.00	320,000.00	1,320,000,00	6,790,000.00
1939	1,000,000.00	280,000.00	1,280,000.00	8,070,000.00
1940	1,000,000.00	240,000.00	1,240,000.00	9,310,000.00
1941	1,000,000.00	200,000.00	1,200,000.00	10,510,000.00
1942		160,000.00	160,000.00	10,670,000.00
1943	1,000,000.00	160,000.00	1,160,000.00	11,830,000.00
1944	3,000,000.00	120,000.00	3,120,000.00	14,950,000.00
Total	$9,000,000.00	$5,950,000.00	$14,950,000.00	$14,950,000.00

The following statement represents the amount derived from the sale of $41,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1927:

TABLE LXI—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $100,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Amount deposited in bond fund.	Accrued interest deposited in road fund.
1924	Dec. 30	97.5575	4.29	$4,000,000.00	$3,913,411.20	$3,902,300.00	$ 11,111.20
1925	May 20	99.881	4.008	10,000,000.00	10,088,100.00	9,988,100.00	100,000.00
1925	Sept. 1	96.422	4.24	10,000,000.00	9,845,533.33	9,642,200.00	203,333.33
1926	Feb. 17	99.062	4.062	5,000,000.00	4,971,988.89	4,953,100.00	18,888.89
1927	April 26	101.601	3.895	6,000,000.00	6,099,286.67	6,096,100.00	3,186.67
1927	Oct. 11	101.016	3.930	6,000,000.00	6,076,800.00	6,061,000.00	15,800.00
Total	----------	99.128	4.035	$41,000,000.00	$40,995,120.09	$40,642,800.00	$352,320.09

The following statement represents the appropriations made from the $100,000,000.00 Bond Issue Fund:

TABLE LXII—APPROPRIATIONS PAYABLE FROM $100,000,000.00 BOND ISSUE FUND.

Year.	For construction.	Amount lapsed October 1, 1925.	Amount lapsed October 1, 1927.
1923	$100,000,000.00	$96,000,000.00	-----------------
1925	96,000,000.00	Re-appropriation	$65,419,289.57
1926	60,000,000.00	-----------------	Re-appropriation
Total	$256,000,000.00	$96,000,000.00	$65,419,289.57

The following statement represents the expenditures made from the sale of $41,000,000.00 of the $100,000,000.00 Bond Issue:

TABLE LXIII—EXPENDITURES FROM $100,000,000.00 BOND ISSUE FUND—1925 TO 1927.

Year.	Administration and engineering.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.	Additions and betterments.	Total.
1925	$1,911,411.30	$19,660,647.25	$28,385.40	$62,484.33	$21,662,928.28
1926	973,454.51	5,788,402.61	25,850.88	34,860.07	6,822,568.07
1927	1,156,027.51	10,492,365.61	19,680.83	75,877.38	11,743,951.33
Totals	$4,040,893.32	$35,941,415.47	$73,917.11	$173,221.78	$40,229,447.68

The following graph shows the proceeds derived from the sale of $41,000,000.00 of the $100,000,000.00 Bond Issue together with the amounts sold during the years 1924 to 1927, inclusive:

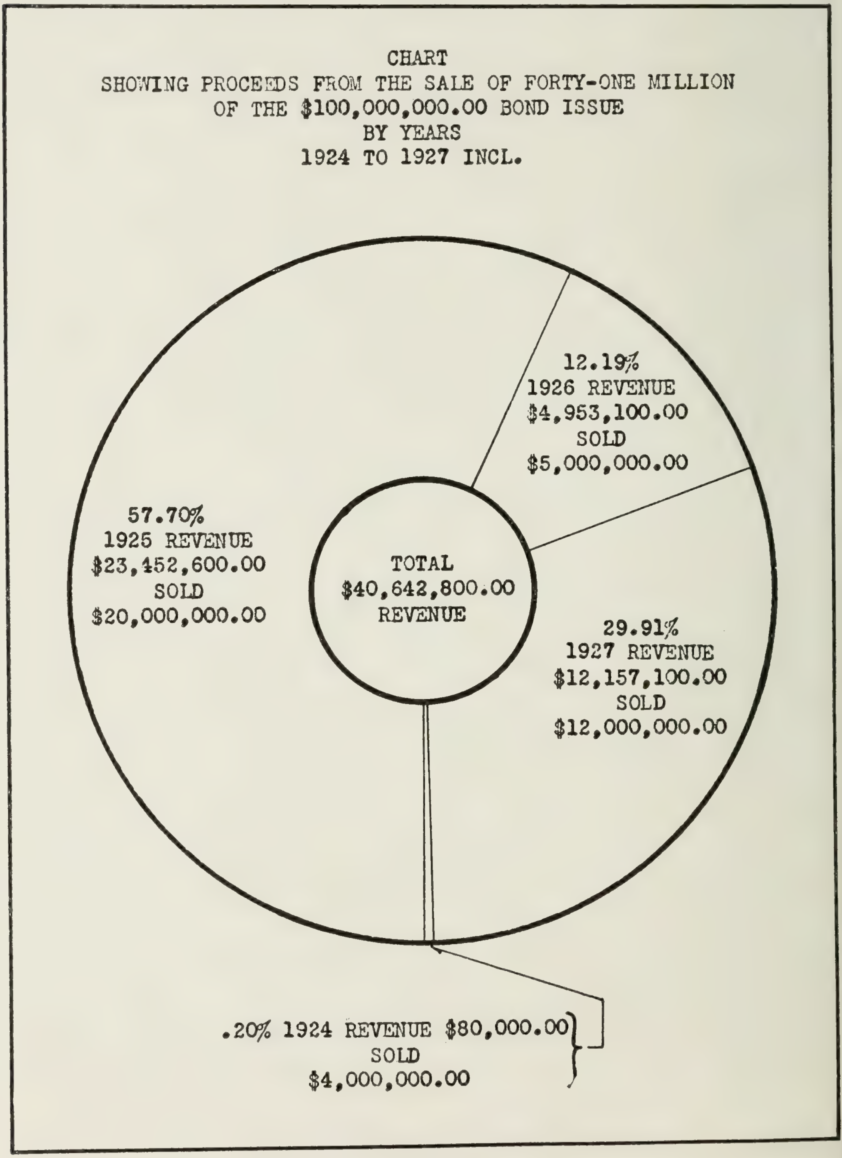

Figure 89.

The following graph shows the division of expenditures of funds derived from the sale of $41,000,000.00 of the $100,000,000.00 Bond Issue during the years 1925 to 1927, inclusive:

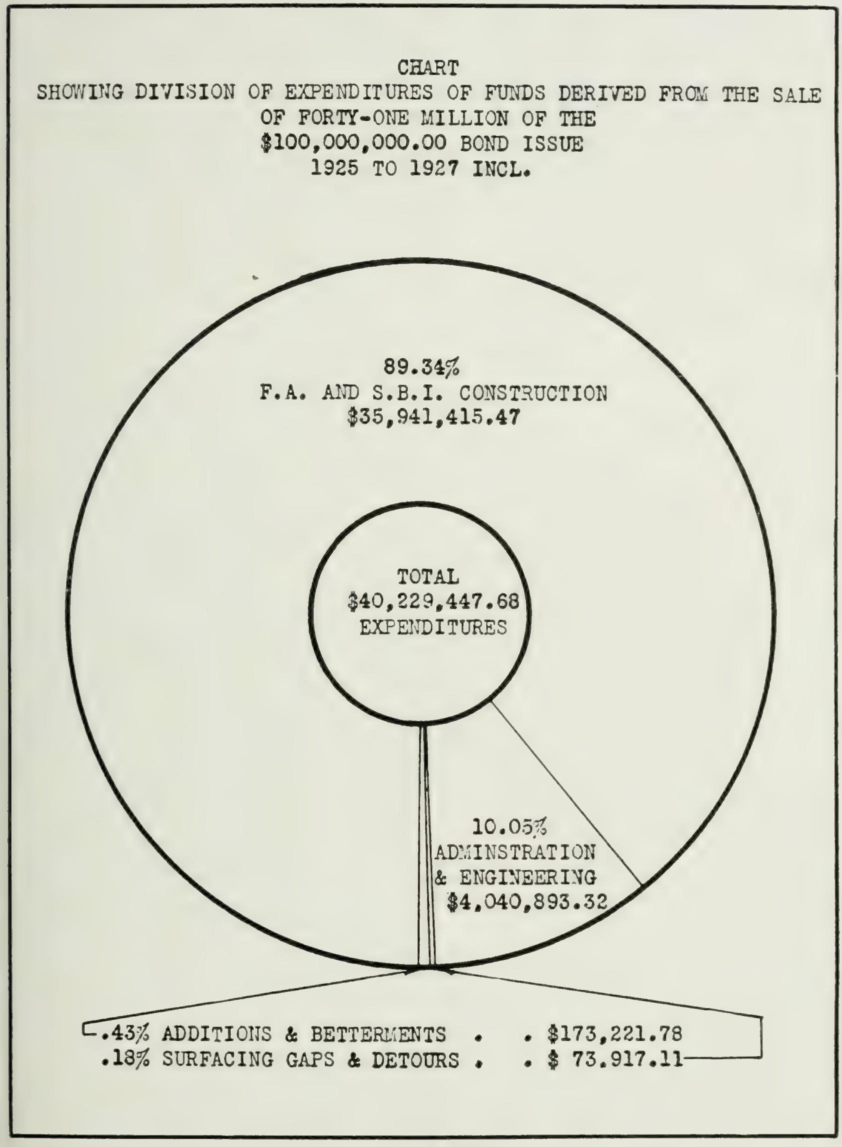

Figure 90.

The following statement represents the amount of principal and interest payable at each retirement and interest paying period on $41,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1927:

TABLE LXIV—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $41,000,000.00—4% BONDS SOLD TO DECEMBER 31, 1927.

Total bonds voted November 4, 1924 $100,000,000.00
Total bonds authorized for sale 100,000,000.00

Year in which principal is to be retired and interest paid.	Principal to be retired Mar. 1 each year.	Principal to be retired May 1 each year.	Total principal to be retired during year.	Interest to be paid Mar. 1 each year.	Interest to be paid May 1 each year.	Interest to be paid Sept. 1 each year.	Interest to be paid Nov. 1 each year.	Total interest payable each year.	Total payable all series each year.
1925					$ 53,333.33	$400,000.00	$ 80,000.00	$ 533,333.33	$ 533,333.33
1926				$400,000.00	130,000.00	400,000.00	180,000.00	1,110,000.00	1,110,000.00
1927				400,000.00	180,000.00	400,000.00	320,000.00	1,300,000.00	1,300,000.00
1928				400,000.00	420,000.00	400,000.00	420,000.00	1,640,000.00	1,640,000.00
1929				400,000.00	420,000.00	400,000.00	420,000.00	1,640,000.00	1,640,000.00
1930				400,000.00	420,000.00	400,000.00	420,000.00	1,640,000.00	1,640,000.00
1931				400,000.00	420,000.00	400,000.00	420,000.00	1,640,000.00	1,640,000.00
1932		$ 500,000.00	$ 500,000.00	400,000.00	420,000.00	400,000.00	410,000.00	1,630,000.00	2,130,000.00
1933		500,000.00	500,000.00	400,000.00	410,000.00	400,000.00	400,000.00	1,610,000.00	2,110,000.00
1934		500,000.00	500,000.00	400,000.00	400,000.00	400,000.00	390,000.00	1,590,000.00	2,090,000.00
1935		500,000.00	500,000.00	400,000.00	390,000.00	400,000.00	380,000.00	1,570,000.00	2,070,000.00
1936		500,000.00	500,000.00	400,000.00	380,000.00	400,000.00	370,000.00	1,550,000.00	2,050,000.00
1937		500,000.00	500,000.00	400,000.00	370,000.00	400,000.00	360,000.00	1,530,000.00	2,030,000.00
1938		500,000.00	500,000.00	400,000.00	360,000.00	400,000.00	350,000.00	1,510,000.00	2,010,000.00
1939		500,000.00	500,000.00	400,000.00	350,000.00	400,000.00	340,000.00	1,490,000.00	1,990,000.00
1940				400,000.00	340,000.00	400,000.00	340,000.00	1,480,000.00	1,480,000.00
1941				400,000.00	340,000.00	400,000.00	340,000.00	1,480,000.00	1,480,000.00
1942				400,000.00	340,000.00	400,000.00	340,000.00	1,480,000.00	1,480,000.00
1943				400,000.00	340,000.00	400,000.00	340,000.00	1,480,000.00	1,480,000.00
1944				400,000.00	340,000.00	400,000.00	340,000.00	1,480,000.00	1,480,000.00
1945	$2,000,000.00	1,500,000.00	3,500,000.00	400,000.00	340,000.00	360,000.00	310,000.00	1,410,000.00	4,910,000.00
1946	2,000,000.00	1,500,000.00	3,500,000.00	360,000.00	310,000.00	320,000.00	280,000.00	1,270,000.00	4,770,000.00
1947	2,000,000.00	1,500,000.00	3,500,000.00	320,000.00	280,000.00	280,000.00	250,000.00	1,130,000.00	4,630,000.00
1948	2,000,000.00	1,500,000.00	3,500,000.00	280,000.00	250,000.00	240,000.00	220,000.00	990,000.00	4,490,000.00
1949	2,000,000.00	1,500,000.00	3,500,000.00	240,000.00	220,000.00	200,000.00	190,000.00	850,000.00	4,350,000.00
1950	2,000,000.00	1,500,000.00	3,500,000.00	200,000.00	190,000.00	160,000.00	160,000.00	710,000.00	4,210,000.00
1951	2,000,000.00	1,500,000.00	3,500,000.00	160,000.00	160,000.00	120,000.00	130,000.00	570,000.00	4,070,000.00
1952	2,000,000.00	1,500,000.00	3,500,000.00	120,000.00	130,000.00	80,000.00	100,000.00	430,000.00	3,930,000.00
1953	2,000,000.00	1,500,000.00	3,500,000.00	80,000.00	100,000.00	40,000.00	70,000.00	290,000.00	3,790,000.00
1954	2,000,000.00	1,500,000.00	3,500,000.00	40,000.00	70,000.00		40,000.00	150,000.00	3,650,000.00
1955		1,000,000.00	1,000,000.00		40,000.00		20,000.00	60,000.00	1,060,000.00
1956		1,000,000.00	1,000,000.00		20,000.00			20,000.00	1,020,000.00
Total	$20,000,000.00	$21,000,000.00	$41,000,000.00	$9,800,000.00	$8,933,333.33	$9,800,000.00	$8,730,000.00	$37,263,333.33	$78,263,333.33

The following statements represent the amounts due at each retirement and interest paying period on each series of $29,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1926:

TABLE LXV—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 1—$4,000,000.00—4% BONDS.

Date of sale—Dec. 30, 1924. Date of issue—Jan. 1, 1925. Rate $97.5575. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925		$53,333.33	$80,000.00	$133,333.33	$133,333.33
1926		80,000.00	80,000.00	160,000.00	160,000.00
1927		80,000.00	80,000.00	160,000.00	160,000.00
1928		80,000.00	80,000.00	160,000.00	160,000.00
1929		80,000.00	80,000.00	160,000.00	160,000.00
1930		80,000.00	80,000.00	160,000.00	160,000.00
1931		80,000.00	80,000.00	160,000,00	160,000.00
1932	$500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1933	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1934	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1935	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1936	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1937	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1938	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1939	500,000.00	10,000.00		10,000.00	510,000.00
Total	$4,000,000.00	$893,333.33	$840,000.00	$1,733,333.33	$5,733,333.33

TABLE LXVI—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$10,000,000.00—4% BONDS.

Date of sale—May 20, 1925. Date of issue—Mar. 1, 1925. Rate $99.881. Yield 4.008.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payalbe at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400.000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200.000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060.000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LXVII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$10,000,000.00—4% BONDS.

Date of sale—Sept. 1, 1925. Date of issue—Mar. 1, 1925. Rate $96.422. Yield 4.24.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000,00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000,00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LXVIII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$5,000,000.00—4% BONDS.

Date of sale—Feb. 17, 1926. Date of issue—Feb. 1, 1926. Rate $99.062. Yield 4.062.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1926	----------	$ 50,000.00	$100,000.00	$150,000.00	$150,000.00
1927	----------	100,000.00	100,000.00	200,000.00	200,000.00
1928	----------	100,000.00	100,000.00	200,000.00	200,000.00
1929	----------	100,000.00	100,000.00	200,000.00	200,000.00
1930	----------	100,000.00	100,000.00	200,000.00	200,000.00
1931	----------	100,000.00	100,000.00	200,000.00	200,000.00
1932	----------	100,000.00	100,000.00	200,000.00	200,000.00
1933	----------	100,000.00	100,000.00	200,000.00	200,000.00
1934	----------	100,000.00	100,000.00	200,000.00	200,000.00
1935	----------	100,000.00	100,000.00	200,000.00	200,000.00
1936	----------	100,000.00	100,000.00	200,000.00	200,000.00
1937	----------	100,000.00	100,000.00	200,000.00	200,000.00
1938	----------	100,000.00	100,000.00	200,000.00	200,000.00
1939	----------	100,000.00	100,000.00	200,000.00	200,000.00
1940	----------	100,000.00	100,000.00	200,000.00	200,000.00
1941	----------	100,000.00	100,000.00	200,000.00	200,000.00
1942	----------	100,000.00	100,000.00	200,000.00	200,000.00
1943	----------	100,000.00	100,000.00	200,000.00	200,000.00
1944	----------	100,000.00	100,000.00	200,000.00	200,000.00
1945	$500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1946	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1947	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1948	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1949	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1950	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1951	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1952	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1953	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1954	500,000.00	10,000.00	----------	10,000.00	510,000.00
Total	$5,000,000.00	$2,400,000.00	$2,350,000.00	$4,750,000.00	$9,750,000.00

TABLE LXIX—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 5—$6,000,000.00—4% BONDS.

Date of sale—April 26, 1927. Date of issue—May 1, 1927. Rate $101.601. Yield 3.895.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1927			$120,000.00	$120,000.00	$120,000.00
1928		$120,000.00	120,000.00	240,000.00	240,000.00
1929		120,000.00	120,000.00	240,000.00	240,000.00
1930		120,000.00	120,000.00	240,000.00	240,000.00
1931		120,000.00	120,000.00	240,000.00	240,000.00
1932		120,000.00	120,000.00	240,000.00	240,000.00
1933		120,000.00	120,000.00	240,000.00	240,000.00
1934		120,000.00	120,000.00	240,000.00	240,000.00
1935		120,000.00	120,000.00	240,000.00	240,000.00
1936		120,000.00	120,000.00	240,000.00	240,000.00
1937		120,000.00	120,000.00	240,000.00	240,000.00
1938		120,000.00	120,000.00	240,000.00	240,000.00
1939		120,000.00	120,000.00	240,000.00	240,000.00
1940		120,000.00	120,000.00	240,000.00	240,000.00
1941		120,000.00	120,000.00	240,000.00	240,000.00
1942		120,000.00	120,000.00	240,000.00	240,000.00
1943		120,000.00	120,000.00	240,000.00	240,000.00
1944		120,000.00	120,000.00	240,000.00	240,000.00
1945	$500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1946	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1947	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1948	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1949	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1950	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1951	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1952	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1953	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1954	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1955	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1956	500,000.00	10,000.00		10,000.00	510,000.00
Total	$6,000,000.00	$2,820,000.00	$2,820,000.00	$5,640,000.00	$11,640,000.00

TABLE LXX—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of Sale—Oct. 11, 1927. Date of Issue—Oct. 1, 1927. Rate $101.016. Yield 3.930.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1. each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total. this series payable each year.
1927			$ 20,000.00	$ 20,000.00	$ 20,000.00
1928		$120,000.00	120,000.00	240,000.00	240,000.00
1929		120,000.00	120,000.00	240,000.00	240,000.00
1930		120,000.00	120,000.00	240,000.00	240,000.00
1931		120,000.00	120,000.00	240,000.00	240,000.00
1932		120,000.00	120,000.00	240,000.00	240,000.00
1933		120,000.00	120,000.00	240,000.00	240,000.00
1934		120,000,00	120,000.00	240,000.00	240,000.00
1935		120,000.00	120,000.00	240,000.00	240,000.00
1936		120,000.00	120,000.00	240,000.00	240,000.00
1937		120,000.00	120,000.00	240,000.00	240,000.00
1938		120,000.00	120,000.00	240,000.00	240,000.00
1939		120,000.00	120,000.00	240,000.00	240,000.00
1940		120,000,00	120,000.00	240,000.00	240,000.00
1941		120,000.00	120,000.00	240,000.00	240,000.00
1942		120,000.00	120,000.00	240,000.00	240,000.00
1943		120,000.00	120,000.00	240,000.00	240,000.00
1944		120,000.00	120,000.00	240,000.00	240,000.00
1945	$ 500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1946	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1947	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1948	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1949	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1950	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1951	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1952	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1953	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1954	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1955	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1956	500,000.00	10,000.00		10,000.00	510,000.00
Totals	$6,000,000.00	$2,820,000.00	$2,720,000.00	$5,540,000.00	$11,540,000.00

The following statement represents the amount of principal and interest payable each year during the retirement of the $60,000,000.00 Bond Issue plus $41,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1927:

TABLE LXXI—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF THE $60,000,000 AND ON $41,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1927.

Year in which principal is to be retired and interest paid.	Principal of $60,000,000.00 bonds to be retired each year.	Principal of $100,000,000.00 bonds to be retired each year.	Total principal both bond issues to be retired each year.	Interest on $60,000,000.00 bonds to be paid each year.	Interest on $100,000,000.00 bonds to be paid each year.	Total interest on both bond issues to be paid each year.	Total principal and interest both bond issues to be paid each year.
1928	$2,000,000.00		$2,000,000.00	$2,240,000.00	$1,640,000.00	$3,880,000.00	$5,880,000.00
1929	2,000,000.00		2,000,000.00	2,160,000.00	1,640,000.00	3,800,000.00	5,800,000.00
1930	2,000,000.00		2,000,000.00	2,080,000.00	1,640,000.00	3,720,000.00	5,720,000.00
1931	2,000,000.00		2,000,000.00	2,000,000.00	1,640,000.00	3,640,000.00	5,640,000.00
1932	2,000,000.00	$ 500,000.00	2,500,000.00	1,920,000.00	1,630,000.00	3,550,000.00	6,050,000.00
1933	2,000,000.00	500,000.00	2,500,000.00	1,840,000.00	1,610,000.00	3,450,000.00	5,950,000.00
1934	2,000,000.00	500,000.00	2,500,000.00	1,760,000.00	1,590,000.00	3,350,000.00	5,850,000.00
1935	3,000,000.00	500,000.00	3,500,000.00	1,680,000.00	1,570,000.00	3,250,000.00	6,750,000.00
1936	3,000,000.00	500,000.00	3,500,000.00	1,560,000.00	1,550,000.00	3,110,000.00	6,610,000.00
1937	3,000,000.00	500,000.00	3,500,000.00	1,440,000.00	1,530,000.00	2,970,000.00	6,470,000.00
1938	4,000,000.00	500,000.00	4,500,000.00	1,320,000.00	1,510,000.00	2,830,000.00	7,330,000.00
1939	4,000,000.00	500,000.00	4,500,000.00	1,160,000.00	1,490,000.00	2,650,000.00	7,150,000.00
1940	5,000,000.00		5,000,000.00	1,000,000.00	1,480,000.00	2,480,000.00	7,480,000.00
1941	5,000,000.00		5,000,000.00	800,000.00	1,480,000.00	2,280,000.00	7,280,000.00
1942	5,000,000.00		5,000,000.00	600,000.00	1,480,000.00	2,080,000.00	7,080,000.00
1943	5,000,000.00		5,000,000.00	400,000.00	1,480,000.00	1,880,000.00	6,880,000.00
1944	5,000,000.00		5,000,000.00	200,000.00	1,480,000.00	1,680,000.00	6,680,000.00
1945		3,500,000.00	3,500,000.00		1,410,000.00	1,410,000.00	4,910,000.00
1946		3,500,000.00	3,500,000.00		1,270,000.00	1,270,000.00	4,770,000.00
1947		3,500,000.00	3,500,000.00		1,130,000.00	1,130,000.00	4,630,000.00
1948		3,500,000.00	3,500,000.00		990,000.00	990,000.00	4,490,000.00
1949		3,500,000.00	3,500,000.00		850,000.00	850,000.00	4,350,000.00
1950		3,500,000.00	3,500,000.00		710,000.00	710,000.00	4,210,000.00
1951		3,500,000.00	3,500,000.00		570,000.00	570,000.00	4,070,000.00
1952		3,500,000.00	3,500,000.00		430,000.00	430,000.00	3,930,000.00
1953		3,500,000.00	3,500,000.00		290,000.00	290,000.00	3,790,000.00
1954		3,500,000.00	3,500,000.00		150,000.00	150,000.00	3,650,000.00
1955		1,000,000.00	1,000,000.00		60,000.00	60,000.00	1,060,000.00
1956		1,000,000.00	1,000,000.00		20,000.00	20,000.00	1,020,000.00
Total	$56,000,000.00	$41,000,000.00	$97,000,000.00	$24,160,000.00	$34,320,000.00	$58,480,000.00	$155,480,000.00

The following statement represents the principal retirement of the $60,000,000.00 Bond Issue plus $41,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1927:

TABLE LXXII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF PRINCIPAL DUE AT EACH RETIREMENT PERIOD ON THE ENTIRE $60,000,000 BOND ISSUE PLUS $41,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1927.

Year in which principal is to be retired.	Principal $60,000,000.00 bonds to be retired Mar. 1 each year.	Principal $100,000,000.00 bonds to be retired Mar. 1 each year.	Total principal both bond issues to be retired Mar. 1.	Principal $60,000,000.00 bonds to be retired May 1 each year.	Principal $100,000,000.00 bonds to be retired May 1 each year.	Total principal both bond issues to be retired May 1.	Total $60,000,000.00 bond principal to be retired each year.	Total $100,000,000.00 bond principal to be retired each year.	Total principal both bond issues to be retired each year.
1928				$2,000,000.00		$2,000,000.00	$2,000,000.00		$2,000,000.00
1929				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1930				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1931				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1932				2,000,000.00	$ 500,000.00	2,500,000.00	2,000,000.00	$ 500,000.00	2,500,000.00
1933				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1934				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1935	$1,000,000.00		$1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1936	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1937	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1938	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1939	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1940	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1941	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1942	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1943	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1944	5,000,000.00		5,000,000.00				5,000,000.00		5,000,000.00
1945		$2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1946		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1947		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1948		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1949		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1950		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1951		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1932		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1953		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1954		2,000,000.00	2,000,000.00		1,500,000.00	1,500,000.00		3,500,000.00	3,500,000.00
1955					1,000,000.00	1,000,000.00		1,000,000.00	1,000,000.00
1956					1,000,000.00	1,000,000.00		1,000,000.00	1,000,000.00
Total	$30,000,000.00	$20,000,000.00	$50,000,000.00	$26,000,000.00	$21,000,000.00	$47,000,000.00	$56,000,000.00	$41,000,000.00	$97,000,000.00

The following statement shows the arrangement of interest paying periods of the entire $60,000,000.00 Bond Issue plus $41,000,000.00 of the $100,000,000.00 Bond Issuse sold to December 31, 1927:

TABLE LXXIII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF INTEREST DUE AT EACH INTEREST PAYING PERIOD ON THE ENTIRE $60,000,000 BOND ISSUE PLUS $41,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1927.

Year in which interest is to be paid.	Interest on $60,000,000.00 bonds to be paid Mar. 1 each year.	Interest on $100,000,000.00 bonds to be paid Mar. 1 each year.	Total interest on both bond issues to be paid Mar. 1 each year.	Interest on $60,000,000.00 bonds to be paid May 1 each year.	Interest on $100,000,000.00 bonds to be paid May 1 each year.	Total interest on both bond issues to be paid May 1 each year.	Interest on $100,000,000.00 bonds to be paid Sept. 1 each year.	Interest on $100,000,000.00 bonds to be paid Nov. 1 each year.	Total interest on $60,000,000.00 bond issue to be paid each year.	Total interest on $100,000,000.00 bond issue to be paid each year.	Total interest on both bond issues to be paid each year.
1928	$1,200,000.00	$400,000.00	$1,600,000.00	$1,040,000.00	$420,000.00	$1,460,000.00	$400,000.00	$420,000.00	$2,240,000.00	$1,640,000.00	$3,880,000.00
1929	1,200,000.00	400,000.00	1,600,000.00	960,000.00	420,000.00	1,380,000.00	400,000.00	420,000.00	2,160,000.00	1,640,000.00	3,800,000.00
1930	1,200,000.00	400,000.00	1,600,000.00	880,000.00	420,000.00	1,300,000.00	400,000.00	420,000.00	2,080,000.00	1,640,000.00	3,720,000.00
1931	1,200,000.00	400,000.00	1,600,000.00	800,000.00	420,000.00	1,220,000.00	400,000.00	420,000.00	2,000,000.00	1,640,000.00	3,640,000.00
1932	1,200,000.00	400,000.00	1,600,000.00	720,000.00	420,000.00	1,140,000.00	400,000.00	410,000.00	1,920,000.00	1,630,000.00	3,550,000.00
1933	1,200,000.00	400,000.00	1,600,000.00	640,000.00	410,000.00	1,050,000.00	400,000.00	400,000.00	1,840,000.00	1,610,000.00	3,450,000.00
1934	1,200,000.00	400,000.00	1,600,000.00	560,000.00	400,000.00	960,000.00	400,000.00	390,000.00	1,760,000.00	1,590,000.00	3,350,000.00
1935	1,200,000.00	400,000.00	1,600,000.00	480,000.00	390,000.00	870,000.00	400,000.00	380,000.00	1,680,000.00	1,570,000.00	3,250,000.00
1936	1,160,000.00	400,000.00	1,560,000.00	400,000.00	380,000.00	780,000.00	400,000.00	370,000.00	1,560,000.00	1,550,000.00	3,110,000.00
1937	1,120,000.00	400,000.00	1,520,000.00	320,000.00	370,000.00	690,000.00	400,000.00	360,000.00	1,440,000.00	1,530,000.00	2,970,000.00
1938	1,080,000.00	400,000.00	1,480,000.00	240,000.00	360,000.00	600,000.00	400,000.00	350,000.00	1,320,000.00	1,510,000.00	2,830,000.00
1939	960,000.00	400,000.00	1,360,000.00	200,000.00	350,000.00	550,000.00	400,000.00	340,000.00	1,160,000.00	1,490,000.00	2,650,000.00
1940	840,000.00	400,000.00	1,240,000.00	160,000.00	340,000.00	500,000.00	400,000.00	340,000.00	1,000,000.00	1,480,000.00	2,480,000.00
1941	680,000.00	400,000.00	1,080,000.00	120,000.00	340,000.00	460,000.00	400,000.00	340,000.00	800,000.00	1,480,000.00	2,280,000.00
1942	520,000.00	400,000.00	920,000.00	80,000.00	340,000.00	420,000.00	400,000.00	340,000.00	600,000.00	1,480,000.00	2,080,000.00
1943	360,000.00	400,000.00	760,000.00	40,000.00	340,000.00	380,000.00	400,000.00	340,000.00	400,000.00	1,480,000.00	1,880,000.00
1944	200,000.00	400,000.00	600,000.00		340,000.00	340,000.00	400,000.00	340,000.00	200,000.00	1,480,000.00	1,680,000.00
1945		400,000.00	400,000.00		340,000.00	340,000.00	360,000.00	310,000.00		1,410,000.00	1,410,000.00
1946		360,000.00	360,000.00		310,000.00	310,000.00	320,000.00	280,000.00		1,270,000.00	1,270,000.00
1947		320,000.00	320,000.00		280,000.00	280,000.00	280,000.00	250,000.00		1,130,000.00	1,130,000.00
1948		280,000.00	280,000.00		250,000.00	250,000.00	240,000.00	220,000.00		990,000.00	990,000.00
1949		240,000.00	240,000.00		220,000.00	220,000.00	200,000.00	190,000.00		850,000.00	850,000.00
1950		200,000.00	200,000.00		190,000.00	190,000.00	160,000.00	160,000.00		710,000.00	710,000.00
1951		160,000.00	160,000.00		160,000.00	160,000.00	120,000.00	130,000.00		570,000.00	570,000.10
1952		120,000.00	120,000.00		130,000.00	130,000.00	80,000.00	100,000.00		430,000.00	430,000.00
1953		80,000.00	80,000.00		100,000.00	100,000.00	40,000.00	70,000.00		290,000.00	290,000.00
1954		40,000.00	40,000.00		70,000.00	70,000.00		40,000.00		150,000.00	150,000.00
1955					40,000.00	40,000.00		20,000.00		60,000.00	60,000.00
1956					20,000.00	20,000.00				20,000.00	20,000.00
Total	$16,520,000.00	$9,000,000.00	$25,520,000.00	$7,640,000.00	$8,570,000.00	$16,210,000.00	$8,600,000.00	$8,150,000.00	$24,160,000.00	$34,320,000.00	$58,480,000.00

The following graph shows a comparison of principal and interest on the $60,000,000.00 Bond Issue and on $41,000,000.00 of the $100,000,000.00 Bond Issue sold to December 31, 1927 against estimated motor license fee revenue during the years in which the bonds are to be retired or paid:

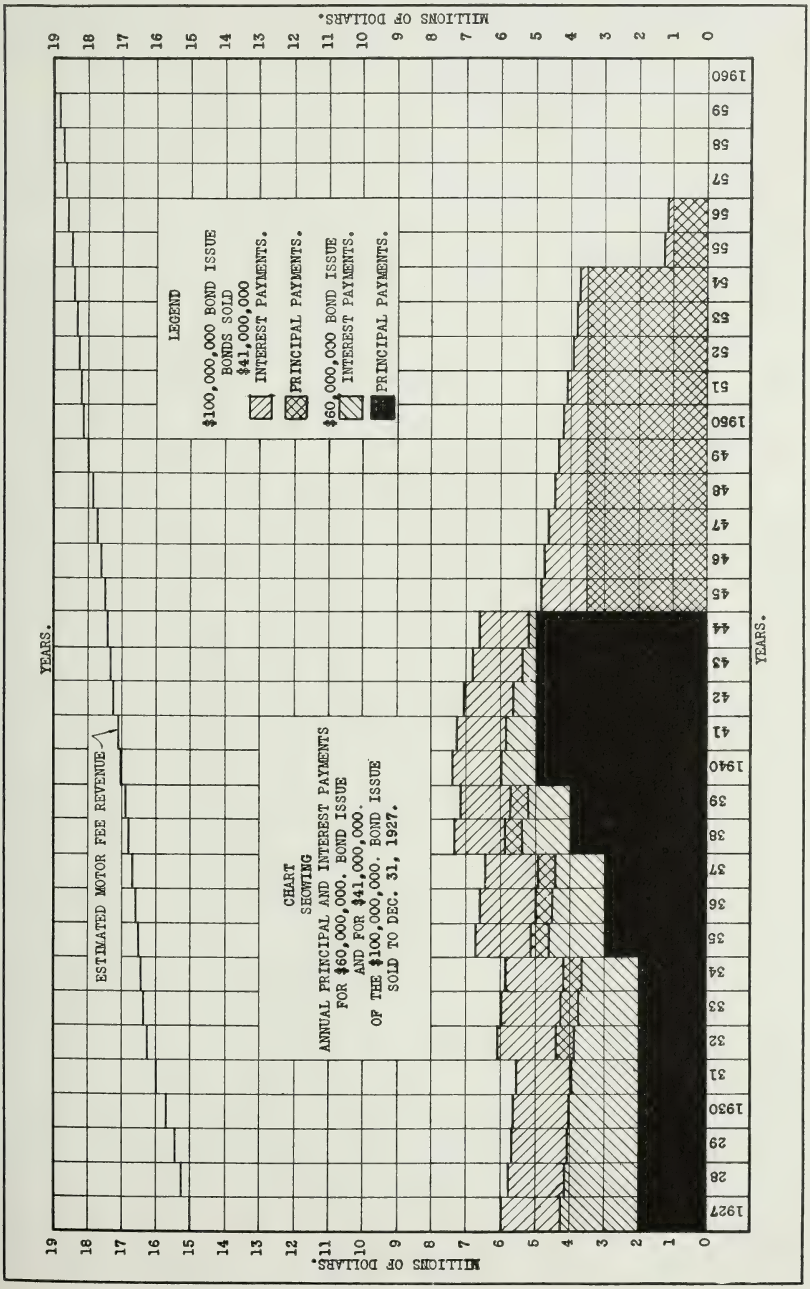

Figure 91.

3. PERMITS, FRANCHISES, LEASES AND RENTALS.—All requests for permits or franchises for the use of the State highways for the construction of entrances to private properties, gasoline filling stations, lunch stands and to companies and corporations for the privilege of placing and maintaining telephone and telegraph lines, electric power transmission lines, water mains, cables, conduits and sewers are carefully investigated in this Bureau as to their legal aspects before being finally approved by the Chief Highway Engineer. During 1927, 2,471 permits of this nature were handled.

All arrangements for the renting or leasing of ground or buildings used by the various sections of the Division of Highways are made by this Bureau and records are kept of such properties.

4. CLAIMS, LIENS AND ASSIGNMENTS.—All liens, claims and assignments filed against contractors covering labor, material or equipment furnished by outside parties are received, recorded and filed in this office. A detailed record of such claims against each contractor for each section of work under contract is kept on file and arrangements are made for taking care of such claims before settlement is made with the contractors.

5. REFUNDS TO COUNTIES.—The following statement shows the amounts appropriated, refunded and lapsed under House Bill No. 766, Refunds to Counties:

TABLE LXXIV—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 766.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923
Bond	$114,837.53	$114,837.53	----------
Boone	3,937.34	----------	$ 3,937.34
Bureau	6,836.42	----------	6,836.42
Cass	5,851.17	----------	5,851.17
Champaign	74,453.33	22,629.13	51,824.20
Clark	126,259.34	126,258.68	.66
Clinton	6,745.00	----------	6,745.00
Coles	36,876.16	----------	36,876.16
Cook	687,935.42	498,954.97	188,980.45
Crawford	10,014.12	----------	10,014.12
Cumberland	94,209.05	92,312.41	1,896.64
DeKalb	51,509.00	51,509.00	----------
Douglas	8,993.93	----------	8,993.93
DuPage	82,042.00	82,042.00	----------
Edgar	1,577.20	----------	1,577.20
Edwards	1,498.69	----------	1,498.69
Effingham	106,181.45	98,590.35	7,591.10
Fayette	160,526.53	147,258.26	13,268.27
Fulton	28,585.10	----------	28,585.10
Iroquois	65,788.51	65,788.39	.12
Jasper	3,350.74	----------	3,357.40
Jefferson	4,168.35	----------	4,168.35
Kane	113,639.55	113,639.55	----------
Kankakee	13,239.47	13,239.47	----------
Lake	143,681.62	143,681.62	----------
Lawrence	6,373.44	----------	6,373.44
Lee	75,726.00	75,708.81	17.19
Livingston	13,119.87	----------	13,119.87
Logan	3,058.65	----------	3,058.65
Macoupin	73,176.31	17,495.88	55,680.43
Madison	206,032.34	174,200.20	31,832.14
Mason	55,882.46	----------	55,882.46
Menard	51,117.01	----------	51,117.01
Mercer	3,870.00	----------	3,870.00

TABLE LXXIV—Concluded.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Monroe	$ 7,035.04		$ 7,035.04
Morgan	7,996.07		7,996.07
Ogle	47,816.63	$ 12,597.86	35,218.77
Peoria	69,285.00	69,043.80	241.20
Piatt	21,027.69		21,027.69
Rock Island	4,650.54		4,650.54
St. Clair	84,210.92	84,210.92	
Sangamon	131,067.24	123,457.62	7,609.62
Schuyler	14,033.49		14,033.49
Stephenson	20,571.79		20,571.79
Tazewell	145,468.89	132,835.12	12,633.77
Vermilion	651,044.41	544,156.60	106,887.81
Warren	41,142.06	31,470.74	9,671.32
Whiteside	75,460.88	73,622.25	1,838.63
Will	21,521.00	16,600.68	4,920.32
Williamson	62,392.88		62,392.88
Winnebago	43,594.60	43,594.60	
Total	$3,889,382.23	$2,969,736.44	$919,645.79

The following statement represents the amounts appropriated, refunded and lapsed under House Bill No. 867, Refunds to Counties:

TABLE LXXV—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 867.

County.	Amount appropriated.	Amounts refunded.	Amounts laped Oct. 1, 1923.
Bureau	$ 6,055.66		$ 6,055.66
Carroll	15,090.56		15,090.56
Clinton	6,745.00		6,745.00
Coles	7,869.21		7,869.21
Cook	492,675.23	$ 18,268.01	474,407.22
DeKalb	60,841.26	3,450.76	57,390.50
Edgar	15,298.92		15,298.92
Franklin	10,493.36		10,493.36
Fulton	8,030.00		8,030.00
Grundy	75,252.00	50,000.00	25,252.00
Jackson	5,909.92		5,909.92
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	84,480.35	72,448.07	12,032.28
Kankakee	62,881.21	62,881.21	
Lake	388,961.15	337,156.27	51,804.88
LaSalle	114,736.57		114,736.57
Lawrence	19,757.21		19,757.21
Lee	25,004.86		25,004.86
Livingston	13,912.26		13,912.26
McHenry	10,647.17		10,647.17
Macoupin	127,876.00		127,876.00
Madison	389,115.77	234,129.24	154,986.53
Marshall	4,307.27		4,307.27
Menard	58,894.30	25,000.00	33,894.30
Ogle	26,288.20		26,288.20
Peoria	170,329.32		170,329.32
Rock Island	15,558.05		15,558.05
St. Clair	133,153.61	118,506.05	14,647.56
Sangamon	164,639.00	156,009.58	8,629.42
Shelby	18,573.03		18,573.03
Whiteside	4,732.04		4,732.04
Will	183,290.57	165,712.27	17,578.30
Winnebago	124,196.40	70,323.39	53,873.01
Total	$2,869,289.87	$1,313,884.85	$1,555,405.02

TABLE LXXVI—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 822.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1925.
Adams	$ 16,256.06		$ 16,256.06
Bond	4,438.92	$ 4,438.92	
Boone	3,762.32	3,762.32	
Bureau	12,894.26	12,854.54	39.72
Carroll	10,024.77	6,551.10	3,473.67
Cass	5,851.17		5,851.17
Champaign	51,746.58	48,535.18	3,211.40
Coles	33,738.22	32,480.92	1,257.30
Cook	984,393.21	720,389.28	264,003.93
Cumberland	6,261.78		6,261.78
DeKalb	58,192.39	23,381.70	34,810.69
DuPage	45,207.17	40,858.47	4,348.70
Edgar	16,876.12	14,148.08	2,728.04
Edwards	1,498.69		1,498.69
Effingham	5,656.37	3,918.26	1,738.11
Ford	5,738.29		5,738.29
Fulton	33,123.80	32,540.30	583.50
Grundy	55,734.87	30,734.87	25,000.00
Iroquois	18,843.00		18,843.00
Jersey	2,930.72		2,930.72
Kane	393,922.37	165,972.21	227,950.16
Kankakee	21,044.78	17,968.30	3,076.48
LaSalle	27,281.15		27,281.15
Lake	214,144.81	85,625.17	128,519.64
Lee	25,004.86	25,004.86	
Livingston	19,160.77	19,160.77	
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Macoupin	162,902.24	162,406.36	495.88
Madison	302,991.28	172,847.39	130,143.89
Marion	1,593.66		1,593.66
Marshall	45,601.86		45,601.86
Mason	54,066.22	54,066.22	
McHenry	10,191.63		10,191.63
Menard	44,773.74	26,242.44	18,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.04	1,000.00	6,035.04
Morgan	7,966.07		7,966.07
Ogle	78,613.10	64,767.39	13,845.71
Peoria	122,739.77	80,818.16	41,921.61
Piatt	11,235.62	11,235.62	
Pike	8,325.16		8,325.16
Putnam	19,073.92	7,000.00	12,073.92
Rock Island	3,029.82		3,029.82
Schuyler	17,583.40	6,929.94	10,653.46
Shelby	17,366.56		17,366.56
St. Clair	483,564.11	483,339.78	224.33
Stephenson	12,838.53	12,838.53	
Tazewell	12,633.48		12,633.48
Vermilion	155,526.79		155,526.79
Warren	38,405.66		38,405.66
Whiteside	4,732.04	4,732.04	
Will	194,128.06	100,340.09	93,787.97
Williamson	66,863.40	55,169.70	11,693.70
Winnebago	61,468.68	61,468.68	
Total	$4,025,632.56	$2,593,527.59	$1,432,104.97

The following statement shows the amounts appropriated for Refunds to Counties for their share of cost of sections incorporated in the State Bond Issue System under Senate Bill No. 515:

TABLE LXXVII—STATEMENT SHOWING AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, SENATE BILL 515.

County.	Amount appropriated.	Amounts refunded.	Balance December 31, 1927.
Adams	$ 16,256.07		$ 16,256.07
Carroll	4,000.00	$ 3,145.84	854.16
Cass	3,450.54	3,450.54	
Coles	1,888.97	1,888.97	
Cook	505,985.35		505,985.35
Douglas	2,949.33	2,949.33	
Edwards	1,498.69	1,498.69	
Effingham	6,297.35	5,058.90	1,238.45
Ford	5,738.29		5,738.29
Fulton	32,540.30		32,540.30
Iroquois	7,498.00	7,498.00	
Jackson	942.00		942.00
Jefferson	1,125.28		1,125.28
Jersey	2,930.72	1,836.64	1,094.08
JoDaviess	20,763.69		20,763.69
Kane	248,924.77	180,296.18	68,628.59
Kankakee	147,419.17	147,419.17	
Lake	50,000.00	41,625.86	8,374.14
LaSalle	21,566.89		21,566.89
Lee	25,004.86		25,004.86
Livingston	26,445.09	7,421.01	19,024.08
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Madison	23,054.63	22,463.23	591.40
Marion	1,895.40		1,895.40
Marshall	45,598.82		45,598.82
Mason	63,814.17		63.814.17
McHenry	10,161.59	10,161.59	
McLean	47,356.52		47,356.52
Menard	3,531.30		3,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.03	6,035.03	1,000.00
Morgan	7,966.07	7,966.07	
Peoria	46,529.39	44,467.72	2,061.67
Piatt	11,235.62		11,235.62
Pike	8,066.39		8,066.39
Putnam	19,073.92	12,000.00	7,073.92
Rock Island	2,746.47	2,746.47	
Sangamon	572,109.87		572,109.87
Schuyler	25,802.02	2,845.86	22,956.16
Shelby	17,554.03	17,554.03	
St. Clair	449,998.24	284,477.40	165,520.84
Stephenson	7,726.37		7,726.37
Tazewell	12,633.48	12,633.48	
Vermilion	19,500.00		19,500.00
Will	109,415.59	109,415.59	
Williamson	52,133.40		52,133.40
Total	$2,704,818.95	$936,855.60	$1,767,963.35

The following statement shows the amounts appropriated and refunded to counties under Senate Bill No. 395 which became available July 1, 1927:

TABLE LXXVIII—STATEMENT SHOWING AMOUNTS REFUNDED TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM FROM APPROPRIATIONS OF $3,000,000.00, S. B. 395, AVAILABLE JULY 1, 1927.

Lump sum appropriation available July 1, 1927		$3,000,000.00
Less—Refunds to Counties—		
Kankakee County	$10,999.46	
Schuyler County	1,128.99	
		12,128.45
Balance, December 31, 1927		$2,987,871.55

6. DISTRIBUTION OF CEMENT TO STATE CONTRACTS. —During the calendar year 1927 the State contracted for 3,000,000 barrels of cement of which 1,757,900 barrels were shipped to the various construction jobs throughout the State.

The payment of all cement furnished for State road work is handled in this Bureau where a record and follow up system for final disposition of cars is kept and a final check is made with the laboratory and district engineers on shipments and transfers to and from the various construction sections.

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

CORNELIUS R. MILLER, *Director*
FRANK T. SHEETS, *Chief Highway Engineer*

ELEVENTH ANNUAL REPORT
--of--
DIVISION OF HIGHWAYS

January 1, 1928
--to--
December 31, 1928

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[Reprinted from the Eleventh Administrative Report. Printed by authority of the State of Illinois.]

ELEVENTH ANNUAL REPORT

ON

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

DIVISION OF HIGHWAYS

Route 34, two miles south of Harrisburg, Saline County.

ELEVENTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

January 1, 1928

TO

December 31, 1928

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS.

CORNELIUS R. MILLER, *Director.*

DON GARRISON, *Assistant Director.*

DIVISION OF HIGHWAYS.

FRANK T. SHEETS, *Chief Highway Engineer and Acting Superintendent of Highways.*

R. R. BENEDICT, *Assistant Chief Highway Engineer.*

BUREAU CHIEFS.

H. E. SURMAN, *Engineer of Design.*

E. D. DRYFOOSE, *Engineer of Roads.*

G. F. BURCH, *Engineer of Bridges.*

C. M. HATHAWAY, *Engineer of Construction.*

FRED TARRANT, *Engineer of Maintenance.*

V. L. GLOVER, *Engineer of Materials.*

J. M. MCCOY, *Chief Clerk.*

DISTRICT ENGINEERS.

District No. 1—G. N. LAMB, Elgin, Ill.
District No. 2—O. F. GOEKE, Dixon, Ill.
District No. 3—M. J. FLEMING, Ottawa, Ill.
District No. 4—THEO. PLACK, Peoria, Ill.
District No. 5—CHAS. H. APPLE, Paris, Ill.
District No. 6—K. N. EVANS, Springfield, Ill.
District No. 7—P. F. JERVIS, Effingham, Ill.
District No. 8—C. M. SLAYMAKER, E. St. Louis, Ill.
District No. 9—L. SCHWARTZ, Carbondale, Ill.

CONTENTS.

Page.

- I. INTRODUCTION 1
- II. BUREAU OF DESIGN 3
  - A. Road Section 3
    - 1. Duties 3
    - 2. Surveys and Plans 4
    - 3. Contracts Awarded 4
    - 4. Design Policies 5
    - 5. Pavement Cross Sections 6
    - 6. Grade Separations 6
    - 7. Federal Aid 6
    - 8. Refunds to Counties and Municipalities 7
    - 9. State Aid System 7
  - B. Bridge Section 8
    - 1. Duties 8
    - 2. Work Accomplished During 1928 8
    - 3. Grade Separations 9
    - 4. Record of Bridge Work 9
    - 5. Description of Photographs 10
- III. BUREAU OF CONSTRUCTION 11
  - 1. Duties 11
  - 2. Work Accomplished During 1928 11
  - 3. Discussion of Construction Data 12
  - 4. Construction Policies 13
  - 5. Cement Shipments 14
  - 6. Construction with State-owned Outfits 14
  - 7. Mileage of Pavement Available for Traffic 15
  - 8. Distribution of Stone from State Penitentiaries 16
  - 9. Description of Photographs 16
- IV. BUREAU OF MATERIALS 17
  - 1. Duties 17
  - 2. General Office 18
  - 3. Laboratory Inspection of Materials 18
  - 4. Plant Inspection of Materials 20
  - 5. Research and Investigation 24
  - 6. Preparation of Reports and Bulletins 29
  - 7. Specifications 29
  - 8. Departmental Service 29
- V. BUREAU OF MAINTENANCE 30
  - 1. Duties 30
  - 2. Maintenance of Surfaced Roads 30
  - 3. Maintenance of Detours, Unpaved and Temporary Routes 32
  - 4. Maintenance of Large Bridges 33
  - 5. Construction of Additions and Betterments 33
  - 6. Snow Removal 33
  - 7. Route Markers and Safety Signs 33
  - 8. Right-of-Way Posts 34
  - 9. Equipment 35
  - 10. Permits and Franchises 35
  - 11. Highway Police 35
  - 12. Accident Reports 36
  - 13. Route Bulletins 36
  - 14. Cost Accounting 36
- VI. BUREAU OF AUDITS 37
  - 1. Duties 37
  - 2. Administrative Section 37
  - 3. Accounting Section 37
  - 4. Blueprinting and Supply Section 39
  - 5. Central and Storage Files Section 39
  - 6. Statements, Charts and Statistics 40
- VII. TABLES 44
- VIII. ILLUSTRATIONS 115

TABLES.

No.		Text on Page.	Table on Page.
I.	Federal Aid and State Bond Issue Contracts Awarded..	4	44
II.	Contracts Awarded from 1916 to 1928, Inclusive, Under Section 15d	4	44
III.	Contracts Awarded During 1928 Under Section 15d.....	4	45
IV.	Construction Through Cities, Built Under House Bill 433	4	45
V.	Grade Separations Completed, 1928	6	46
VI.	Federal Aid Allotments	6	46
VII.	Grade Separation Cases Settled, 1928	6	47
VIII.	Status of Federal Aid January 1, 1929	6	48
IX.	Refund to Counties	7	50
X.	Refund to Cities	7	50
XI.	Status of State Aid Mileage	8	51
XII.	Preliminary Grade Separation Plans Prepared	9	52
XIII.	Complete Grade Separation Plans Prepared	9	53
XIV.	Contracts Awarded for Grade Separation Structures....	9	53
XV.	Bridge Plans and Contracts Awarded from 1906 to 1928	9	53
XVI.	Summary Showing Amounts and Types of Pavement Constructed During 1928	11	54
XVII.	Summary of 1928 Construction	12	54
XVIII.	Work Constructed by State-owned Outfits	15	55
XIX.	Total Mileage of Pavement Available to Traffic in Each County January 1, 1929	15	55
XX.	Crushed Stone Shipped from Joliet and Menard Penitentiaries During 1928	16	57
XXI.	Quantity of Material Accepted by Plant Inspection and Unit Cost of Inspection for the Calendar Year 1928..	21	57
XXII.	Quantities of Materials Inspected for Other Departments of the State of Illinois and for Other States During the Calendar Year 1928	21	57
XXIII.	Paint Handled by Bureau of Materials During the Calendar Year 1928	30	58
XXIV.	Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Surfaced Roads Maintained on a Calendar Year Basis for 1928 in All Districts	30	59
XXV.	Number of Films, Prints and Slides Prepared for the Various Bureaus During 1928	29	59
XXVI.	Statement Showing Comparison of Miles and Cost of Various Types Maintained During the Calendar Year 1928	31	60
XXVII.	Statement Showing Comparison of Mileages and Cost on Per Mile Basis by Types and Units for the Calendar Year 1928	31	61
XXVIII.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 6,203.37 Miles of Concrete Roads in All Districts for the Calendar Year 1928	31	62
XXIX.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 178.44 Miles of Brick Roads in All Districts for the Calendar Year 1928	31	63
XXX.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 42.55 Miles of Bituminous Concrete in All Districts for the Calendar Year 1928	32	64
XXXI.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 25.85 Miles of Bituminous Macadam Roads in All Districts for the Calendar Year 1928...	32	65
XXXII.	Consolidated Statement Showing cost of Maintenance and Upkeep of 45.82 Miles of W. B. Macadam Roads in All Districts for the Calendar Year 1928	32	66

No.		Text on Page.	Table on Page.
XXXIII.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 165.11 Miles of Gravel Roads in All Districts for the Calendar Year 1928	32	67
XXXIV.	Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Detour Roads Maintained on a Calendar Year Basis for 1928 in All Districts	32	68
XXXV.	Statement Showing Comparison of Miles and Cost of Various Types of Detour Roads Maintained During the Calendar Year 1928	32	69
XXXVI.	Statement Showing Comparison of Mileages and Costs on Per Mile Basis for Detour Roads by Types and Units for the Calendar Year 1928	32	70
XXXVII.	Consolidated Statement Showing the Cost of Maintenance and Upkeep on All Types of Detours, Unpaved and Temporary Routes for the Calendar Year 1928	32	71
XXXVIII.	Statement Showing Cost of Maintenance and Upkeep of Bridges Over 100 Foot Span (Located in the Various Districts) for the Calendar Year 1928	33	72
XXXIX.	Statement Showing Cost of Additions and Betterments in All Districts for the Calendar Year 1928	33	73
XL.	Statement Showing Cost of Snow Removal for the Northern, Central and Southern Zones for the Calendar Year 1928	33	74
XLI.	Statement Showing Cost of Marking Routes Through Cities in All Districts for the Calendar Year 1928	34	74
XLII.	Annual Report of Illinois State Highway Police for 1928	35	75
XLIII.	Trial Balance Covering Transactions of the Bureau of Maintenance for the Calendar Year 1928	36	76
XLIV.	Summary of Yearly Expenditures from the Road Fund, $60,000,000 and $100,000,000 Bond Funds and the General Revenue Fund Appropriations from 1913 to 1928, inclusive	40	77
XLV.	Statement Showing Balances, Receipts and Expenditures for All Funds Combined for the Calendar Year 1928	40	79
XLVI.	Highway Bond Retirement and Interest Calculations on All Series of the $60,000,000 and on $77,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1928	40	80
XLVII.	Highway Bond Retirement and Interest Calculations, Showing the Amount of Principal Due at Each Retirement Period on the Entire $60,000,000 Bond Issue Plus $77,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1928	40	81
XLVIII.	Highway Bond Retirement and Interest Calculations, Showing the Amount of Interest Due at Each Interest Paying Period on the Entire $60,000,000 Bond Issue Plus $77,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1928	40	82
XLIX.	Statement of Federal Aid Funds Allotted by the U. S. Government to Illinois from 1917 to 1930, Inclusive	41	83
L.	Schedule of Motor Fee Receipts by Secretary of State	41	83
LI.	Schedule of Motor Fee Receipts by Secretary of State	41	84
LII.	Schedule of Motor Fees by Counties as Collected by Secretary of State	41	84
LIII.	Statement Showing Collections of the Division of Highways and Sources from Which Collected, January 1, 1928, to December 31, 1928	41	86
LIV.	Statement Showing Road Fund Revenue (Exclusive of Gas Tax) Deposited in State Treasury by Months During the Calendar Year 1928	41	86
LV.	Road Fund Revenue Deposited in State Treasury from 1911 to 1928, inclusive	41	86
LVI.	Appropriations Payable from Road Fund from 1913 to 1927, inclusive	41	87
LVII.	Expenditures from the Road Fund, 1914 to 1928, inclusive	41	88
LVIII.	Statement Showing Road Fund Balances, Receipts and Expenditures by Months for the Calendar Year 1928 (Exclusive of Gas Tax)	41	89

No.		Text on Page.	Table on Page.
LIX.	Highway Bond Retirement and Interest Calculations on All Series of $60,000,000—4% Bonds	41	90
LX.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 1, $5,000,000—4% Bonds	41	90
LXI.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 2, $6,000,000—4% Bonds	41	91
LXII.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 3, $6,000,000—4% Bonds	41	91
LXIII.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 4, $6,000,000—4% Bonds	41	92
LXIV.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 5, $7,000,000—4% Bonds	41	92
LXV.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 6, $6,000,000—4% Bonds	41	93
LXVI.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 7, $6,000,000—4% Bonds	41	93
LXVII.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 8, $9,000,000—4% Bonds	41	94
LXVIII.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 9, $9,000,000—4% Bonds	41	94
LXIX.	Bond Fund Revenue Deposited with State Treasurer Derived from Sale of $60,000,000 Bond Issue	41	95
LXX.	Appropriations Payable from $60,000,000 Bond Issue Funds	42	95
LXXI.	Expenditures from $60,000,000 Bond Issue Fund, 1921 to 1924, inclusive	42	95
LXXII.	Highway Bond Retirement and Interest Calculations on All Series of $77,000,000—4% Bonds Sold to December 31, 1928	42	96
LXXIII.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 1, $4,000,000—4% Bonds	42	97
LXXIV.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 2, $10,000,000—4% Bonds	42	97
LXXV.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 3, $10,000,000—4% Bonds	42	98
LXXVI.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 4, $5,000,000—4% Bonds	42	99
LXXVII.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 5, $6,000,000—4% Bonds	42	100
LXXVIII.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 6, $6,000,000—4% Bonds	42	101
LXXIX.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 7, $7,000,000—4% Bonds	42	102
LXXX.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 8, $13,000,000—4% Bonds	42	103
LXXXI.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 9, $9,000,000—4% Bonds	42	104
LXXXII.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations, Series No. 10, $7,000,000—4% Bonds	42	105
LXXXIII.	Bond Fund Revenue Deposited with State Treasurer Derived from Sale of $77,000,000 of the $100,000,000 Bond Issue	42	105
LXXXIV.	Appropriations Payable from $100,000,000 Bond Issue Fund	42	106

No.		Text on Page.	Table on Page.
LXXXV.	Expenditures from $100,000,000 Bond Issue Fund, 1925 to 1928, inclusive	42	106
LXXXVI.	Statement Showing $100,000,000 Bond Fund Balances, Receipts and Expenditures by Months for the Calendar Year 1928	42	106
LXXXVII.	Appropriations Payable from General Revenue Fund, as by the 54th and 55th General Assemblies	42	107
LXXXVIII.	Statement Showing Expenditures from 55th G. A. Revenue Fund Appropriations During the Calendar Year 1928	42	107
LXXXIX.	Statement Showing Revenue Fund Receipts and Expenditures by Months for the Calendar Year 1928	42	108
XC.	Statement Showing the Amounts Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, House Bill 766	43	109
XCI.	Statement Showing the Amounts Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, House Bill 867	43	110
XCII.	Statement Showing Total Refunds to Municipalities from July 1, 1927, to December 31, 1928	43	110
XCIII.	Statement Showing the Amounts Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, House Bill 822	43	111
XCIV.	Statement Showing the Amounts Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, Senate Bill 515	43	112
XCV.	Statement Showing the Amounts Refunded to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System from Appropriation of $3,000,000, Senate Bill 395	43	112
XCVI.	Statement Showing the Amounts Refunded to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System to December 31, 1928	43	113

ILLUSTRATIONS.

Fig.		Text on Page.	Figure on Page.
	Route 34, Two Miles South of Harrisburg, Saline County	Frontispiece	
1.	Chart Showing Roads Constructed on State Highway System from 1914 to 1928, inclusive	1	115
2.	Graphs Showing Unit Price Range on Principal Items in Highway Construction During 1928	5	116
3.	Graphs Showing Unit Price Range on Principal Items in Highway Construction, 1919 to 1928	5	117
4.	Typical Cross Sections in Use January 1, 1928 to December 31, 1928	6	118
5.	Typical Cross Sections in Use January 1, 1928 to December 31, 1928	6	119
6.	East Approach to the Bridge Over the Illinois River at Florence	9, 10	120
7.	Illinois River Bridge at Florence. Construction View Taken in September, 1928	10	120
8.	Grade Separation Structure Over Illinois Central Railroad at Cobden	10	121
9.	Deck Girder Bridge Over Small Pox Creek in JoDaviess County.	10	121
10.	The Old Bridge Over the Big Muddy River East of Murphysboro	10	122
11.	The New Bridge Over the Big Muddy River East of Murphysboro	10	122
12.	Plate Girder Bridge Over Hennepin Canal at Bureau	10	123
13.	Grade Separation Structure Over Chicago and Alton Railroad at Gardner	10	123
14.	Erecting Steel for 200 Foot Span Over Big Bay Creek at Elizabethtown	10	124
15.	Bridge Over Big Bay Creek at Elizabethtown	10	124
16.	Curve Showing Average Daily Output of Concrete in Square Yards from 1921 to 1928, inclusive	12	125
17.	Curves Showing Monthly Output of Payment Estimates	12, 14	125
18.	Curve Showing the Weekly Construction Progress During 1928	12, 14	126
19.	Curves Showing Progress of Pavement Construction During 1928 in Comparison with Previous Years	12	126
20.	Cost Analysis Diagram for Each $1.00 Expended for 18 Foot Concrete Pavement from 1922 to 1928, inclusive	13	127
21.	Cost Analysis Diagram for Each $1.00 Expended for 18 Foot Concrete Pavement During 1928	13	127
22.	Curves Showing Cement Shipment in 1924 and 1928	14	128
23.	Typical Paving Unit of Ten Years Ago	16	129
24.	A Modern Paving Unit	16	129
25.	A Modern Earth Moving Outfit	16	130
26.	Trimming Subgrade and Testing It for Depth	16	130
27.	Smoothing and Compacting Subgrade in Front of Mixer	16	131
28.	Constructing First Half of 40-Foot Pavement	16	131
29.	Wetting Burlap Placed Over Pavement Immediately Back of the Mixer	16	132
30.	Constructing Concrete Base and Curb for Brick Pavement	16	132
31.	The Old Subway Under the Pennsylvania Railroad at Maroa	16	133
32.	The New Subway Under the Pennsylvania Railroad at Maroa	16	133
33.	Grade Separation Between Route 32 and the Vandalia Railroad and the Bridge Over the Little Okaw River Near Lovington	17	134
34.	Location of the Improvements Shown in Figure 33	17	134
35.	Route 39 Near Mahomet Before Construction	17	135
36.	Route 39 Near Mahomet After Construction, Showing New Alignment and Bridge Over the Sangamon River	17	135
37.	A Portion of Route 39 Before Construction	17	136
38.	The Portion of Route 39 Shown in Figure 37 After Construction, Showing Improved Alignment Which Eliminated a Railroad Grade Crossing	17	136
39.	An Outlet for a Lip Curb Section on Route 9	17	137
40.	Route 2 Along the Rock River Between Dixon and Rockford	17	137
41.	Transverse Testing Machine Designed and Used by the Illinois Division of Highways	27	138
42.	Watersoaking an Embankment on Route 24 East of Springfield	28	138
43.	Chart Showing Division of Mileage of Surfaced Roads Maintained for the Calendar Year 1928	30	139

Fig.		Text on Page.	Figure on Page.
44.	Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on Surfaced Roads for the Calendar Year 1928	31	139
45.	Chart Showing Division of Costs of the Bureau of Maintenance on Surfaced Roads by Cost Components for the Calendar Year 1928	31	140
46.	Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on 6,203.37 Miles of P. C. Concrete Roads for the Calendar Year 1928	31	140
47.	Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on 178.44 Miles of Brick Roads for the Calendar Year 1928	31	141
48.	Chart Showing Division of Mileage of Detour Roads Maintained for the Calendar Year 1928	32	141
49.	Chart Showing Division of Costs of Maintaining Detours, Unpaved and Temporary Routes for the Calendar Year 1928	32	142
50.	Chart Showing Division of Costs of the Bureau of Maintenance on Detours, Unpaved and Temporary Routes by Cost Components for the Calendar Year 1928	32	142
51.	Chart Showing Distribution of Snow Fall in Illinois During the Calendar Year 1928	33	143
52.	Snow Drift on Route 78, One Mile South of Warren, JoDaviess County, December, 1928	33	144
53.	Rotary Snow Plow Working in the Snow Drift Shown in Figure 52	33	144
54.	Typical Roadside Route Marker and the Type of Government Shield Adopted for General Use	34	145
55.	Typical Telephone Pole Route Marking	34	145
56.	Typical Route Junction Marker	34	145
57.	Typical Junction Objective and Distance Marker	34	145
58.	Typical City Limits Population Marker	34	146
59.	Typical City Limits Objective and Distance Marker	34	146
60.	Typical City Route Marker and Type of Government Shield Adopted for Use in Cities	34	146
61.	Typical City Objective and Distance Marker	34	146
62.	Typical Square Warning Sign for Cross Roads	34	147
63.	Typical Square Warning Sign for Curve	34	147
64.	Typical Diamond Shaped Warning Sign at Curve	34	147
65.	Typical Diamond Shaped Warning Sign at Junction	34	147
66.	Typical City Cross Street Stop Marker	34	148
67.	Typical Octagonal Shaped Warning Marker	34	148
68.	Typical Grade Crossing Warning Markers	34	148
69.	Map of Illinois Showing U. S. Marked Routes	34	149
70.	Chart Showing Division of Costs of Highway Police Officers for the Calendar Year 1928	35	150
71.	Chart Showing Division of Costs of Bureau of Maintenance According to Activities for the Calendar Year 1928	36	150
72.	Chart Showing Source of Expenditures and Total Cost of the Bureau of Maintenance for the Calendar Year 1928	36	151
73.	Chart Showing Division of Revenues by Funds, 1911 to 1928, inclusive	40	151
74.	Accounting Classification and Flow Chart	38	152
75.	Chart Showing Division of the Combined Expenditures from the Road Fund, $60,000,000 Bond Fund and $100,000,000 Bond Fund, 1914 to 1928, inclusive	40	153
76.	Chart Showing Division of Road Fund Revenues Exclusive of Gas Tax, 1911 to 1928, inclusive	41	153
77.	Chart Showing Annual Principal and Interest Payments for $60,000,000 Bond Issue and for $77,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1928	40	154
78.	Chart Showing Division of Road Fund Expenditures, 1914 to 1928, inclusive	41	155
79.	Chart Showing Proceeds of Sales of $60,000,000 Bond Issue by Years, 1921 to 1924, inclusive	41	155
80.	Chart Showing Division of Expenditures of Funds Derived from the Sale of the $60,000,000 Bond Issue, 1921 to 1924, inclusive	42	156
81.	Chart Showing Proceeds from the Sale of $77,000,000 of the $100,000,000 Bond Issue by Years, 1924 to 1928, inclusive	42	156
82.	Chart Showing Division of Expenditures of Funds Derived from the Sale of $77,000,000 of the $100,000,000 Bond Issue, 1925 to 1928, inclusive	42	157

DIVISION OF HIGHWAYS.

Frank T. Sheets, *Chief Highway Engineer.*

I. INTRODUCTION.

This report summarizes the work accomplished by the Division of Highways during the calendar year ending December 31, 1928, and is submitted as a part of the Administrative Report required under Section 25 of the Civil Administrative Code.

The Division of Highways, which is a part of the Department of Public Works and Buildings, has immediate control and supervision over the location, construction and maintenance of State highways. It is charged with the administration of the provisions of the $60,000,000 Bond Issue Act of 1918, the $100,000,000 Bond Issue Act of 1924, and with the general supervision of work constructed on the State aid system by the counties under Section 15d of the State Aid Act. It also acts in an advisory capacity to the counties and townships in connection with the improvement of the roads under their jurisdiction.

The executive officers are the Superintendent of Highways and the Chief Highway Engineer. They are assisted by a corps of bureau chiefs located in Springfield. In addition, there are nine district engineers working under the general direction of the executive officers and the bureau chiefs. The bureaus are designated as the Bureau of Design, which is divided into a Road Section and a Bridge Section; the Bureau of Construction; the Bureau of Maintenance; the Bureau of Materials, and the Bureau of Audits. The district engineers cooperate with each bureau chief in the conduct of the work which concerns that bureau.

During 1928 the Division of Highways accomplished the greatest construction program in its history. A total of 1304.75 miles of pavement were completed, of which 1075.27 miles were on the State Bond Issue System. The remaining 229.48 miles were completed under State supervision by the counties on the State aid system under Section 15d of the State Aid Law. Of the 1304.75 miles completed, all but 13.62 miles were of rigid type construction, this 13.62 miles being of the gravel type. If rigid type pavements only are considered, no season's accomplishment greater than this has ever been reported, and this mileage, therefore, may be considered as an undisputed world's record for this type of construction.

Figure 1 shows the mileage of pavement which has been completed by years from 1914 to 1928, inclusive, and from this chart may be traced the progress of the road building in Illinois. Road building started in 1914 when the original State Aid Act came into operation. There was a steady increase in road building activities from 1914 to 1917, but this was limited by the funds available. The maximum mileage completed during any one year was only 184.38 miles. During the World War, there was a decline in road building activities, but in 1919 it revived when intensive construction was started on the $60,000,000 State Bond Issue System. There was a steady increase in the mileage constructed from 1919 until 1924, at which time a record for rigid type pavement construction was established when 1229.48 miles of pavement were built. During 1925 and 1926 there was again a decline due to the legal difficulties encountered in the completion of the $60,000,000 Bond Issue System as required by the $100,000,000 Bond Issue Act. These difficulties, however, were surmounted during 1926, and the first contracts on the new system were let during 1927. During that year a total of 668.44 miles were built, part of which was on the $60,000,000 Bond Issue System and part on the $100,000,000 Bond Issue System. During 1927 and 1928 it was possible to place a large mileage under contract, with the result that a new record was established in 1928 with the completion of 1304.75 miles.

During the period from 1918 to 1928 great progress has been made in the development of equipment and methods of constructing modern pavements. When construction work was first started on the bond issue system, it was necessary to store aggregates and cement in large quantities during the early months of the year because of the peak load demands from other industries during the summer months. Railroad equipment was not kept in reserve for the shipment of road building materials, and when grain and coal movements started in the fall there was considerable car shortage. Contractors' equipment was in an undeveloped stage and oftentimes large sums of money were lost in purchasing unsuitable or unbalanced machinery. The personnel for operating the construction outfits was inexperienced, and there were few cost figures available from which a contractor might prepare a responsible bid. But due to the increase in highway construction in Illinois and adjoining states, the road building industry has established itself during the last decade, and its present high state of efficiency has been developed primarily by cooperation and study on the part of engineers, contractors, material producers, equipment manufacturers, and railroad officials.

Road building equipment is no longer in the experimental stage Manufacturers and jobbers are now cooperating, so that instead of each manufacturer promoting his own sales, equipment is being furnished through supply houses handling several products. At the present time a satisfactory paving outfit is a well-balanced plant in which each unit is designed to operate efficiently with the other units, and efforts are now directed more or less toward improvements in the units from the standpoint of economic plant operation. Ten years ago the best paving outfit could build approximately eight miles of 18-foot concrete pavement per year. Today every progressive contractor estimates a yearly production of fifteen miles or more under favorable working conditions. The average contractor of today knows exactly what he is bidding on. He examines the job and studies all of its details. He may even refuse to bid because the job is not adapted to his particular equipment. Keen competition has taught him the necessity of considering every factor involved in the work. Unless he does so, one or two items overlooked may result in an otherwise profitable job being turned into a direct loss. When the amount of money invested in the road construction industry and its allied interests is considered, it brings to mind the very important thought that the yearly construction programs of the State, counties, townships, and cities should be stabilized in so far as possible. With large sums of money invested in an industry capable of a predetermined production capacity, it seems the part of good business to stabilize production to the end that each contributing unit may operate at a rate of production approximately equivalent to that for which it is designed. Otherwise, fluctuating yearly construction programs may result in a real economic loss.

One of the outstanding features of the 1928 construction program was the attention paid to the traffic problem in the metropolitan area adjacent to Chicago. Approximately 45 miles of concrete pavement 40 feet in width were constructed in this area. The construction of these wide pavements and the continuance of a program of such construction will do much towards relieving the conditions which now exist.

The maintenance organization was further developed and every precaution taken to safeguard the public's investment by thorough and adequate maintenance. A particular effort was made to keep the pavements clear of snow during winter months, so that the flow of traffic would be uninterrupted. The marking system was further perfected and many additional modern signs installed.

A detailed report of the activities of each bureau will be found in the following pages. All statistical information is based on the calendar year of 1928.

II. BUREAU OF DESIGN.

The Bureau of Design directs the execution of the preliminary work necessary before actual construction operations can be started. This includes the location of the highways, the design of the pavement and structures, and placing the work under contract. This work is administered through a Road Section and a Bridge Section, the Engineer of Design exercising general supervision over the work of both sections.

A. ROAD SECTION.

1. DUTIES.—The Road Section has general direction of the following activities: the formulation of policies of design; the making of reconnaissance surveys; the performance of special investigations necessary to select satisfactory final locations; the making of final surveys; the preparation of plans and estimates; the preparation of right-of-way negotiations; the advertisement of work for letting; the receiving and analyzing of bids; the awarding and execution of contracts; alterations in the county State aid road systems; refunds to counties and municipalities for work built by them and utilized in the State-wide system; the separation of grades at intersections with railroads, and other special

duties related to the design of roads. All activities requiring field work, such as final surveys and the preparation of plans, are performed by the district organizations, but they report to the Engineer of Design on all matters concerning this work.

2. SURVEYS AND PLANS.—Before the final location of a road can be decided upon, preliminary studies must be made to secure essential information upon which to base the final selection. Such factors as distance to travel, relative cost, service to the traveling public, and safety must be considered. Data are secured by reconnaissance surveys made usually by the bureau chiefs and district engineers. Many such surveys were made during 1928 on the routes designated and described as a part of the $100,000,000 State-wide system of durable hard-surfaced roads. In addition, it has been the practice to hold public hearings at which the general public is privileged to express its opinions as to the feasibility of the possible locations.

When the final location has been determined, the final surveys are made and plans prepared. During 1928 final surveys and plans were completed for approximately 2,128 miles of new work, of which 1,274 miles of pavement and 351 miles of grading were placed under contract. In addition bids had been received for 246 miles of pavement and 75 miles of grading but the award of the contract had not been made on December 31, 1928. Plans were complete for 174 miles of pavement and eight miles of grading for which bids had not been asked.

3. CONTRACTS AWARDED.—The contracts for road work which have been awarded directly by the State from 1914 to 1928, inclusive, on the State-wide and Federal aid systems are shown in Table I. Of the contracts awarded during 1928, 14.61 miles of grading and 39.79 miles of pavement were on the $60,000,000 State-wide system, and 336.85 miles of grading and 1234.30 miles of pavement were on the $100,000,000 State-wide system.

Since the discontinuance of State-aid allotments, all improvements on the State aid system made under the general direction of the State have been performed in accordance with the provisions of Section 15d of the State Aid Act. The amount of such work placed under contract from 1916 to 1928, inclusive, is shown in Table II. The contracts awarded by the various counties during 1928 under Section 15d are shown in Table III.

Under the provisions of the $60,000,000 State-wide Act, the State was not permitted to extend the roads described through cities and villages having a population greater than 2,500. Because there were a number of such towns which could not afford to improve their streets to connect with the State roads constructed to the corporate limits, the Fifty-fourth General Assembly passed House Bill 433 making an appropriation to permit the State to extend $60,000,000 bond issue roads through municipalities of more than 2,500 population. The Fifty-fifth General Assembly also made an appropriation for the same purpose. During 1928, one section, .143 of a mile in length, was awarded under the provisions of these Acts, this section being located in the city of Ottawa on Route 23. The cost was $4,868.10, including the cost of the cement which was furnished by the State. Table IV shows the location, length, and total cost of all construction work which has been performed under the provisions of House Bill No. 433.

(a) *Unit Prices.*—In connection with the bids received for contract work, it has been the practice to make a study of the unit prices submitted for the various items of work. Such information is valuable in studying the trend of prices from year to year. The contract unit prices for the principal items in highway construction during 1928 are shown in Figure 2. The dates on which bids were received are shown at the bottom of the chart. The points on the graphs are plotted from weighted average unit prices submitted for the performance of all Federal aid and State bond issue contracts. The weighted average unit prices by years from 1919 to 1928, inclusive, are shown in Figure 3. With the exception of Class A concrete in separate bridge contracts and the concrete in 7-inch concrete pavements, the unit prices indicate a slight decrease when compared with the prices submitted during 1927. The increase in the cost of Class A concrete is probably caused by the fact that bridge contractors are keeping better cost figures and bidding accordingly. The amount of Class A concrete included in pavement and grading contracts is usually small and the contractors do not figure the cost as closely as in the case of separate bridge contracts. The increase in the cost of 7-inch concrete pavement is probably due to the relatively small length of the sections and to the fact that they are usually situated near the larger centers of population where a higher wage scale predominates.

4. DESIGN POLICIES.—The changes made in design policies during 1928 are as follows:

(a) *Four-inch Open Expansion Joints.*—Provisions were made to place expansion joints at intervals of 800 to 1,000 feet in concrete pavements to compensate for expansion of the concrete due to temperature changes. Based on experience in District No. 2 where a number of these joints have been constructed, it seems reasonably certain that they will prevent to a large extent rupture of the concrete at points where excessive compression develops during hot weather. The joints are 4 inches in width and are filled with bituminous material. In addition to being placed at stated intervals on level stretches of pavement, they are constructed at the top and bottom of hills and at the beginning and end of curves. A special design was prepared for the pavement adjacent to the joint, the pavement being increased to 9 inches in thickness and tapered to 6 inches in thickness at a point 6 feet from the joint.

(b) *Super-elevation.*—Prior to 1928 the rate of super-elevation of all horizontal curves was computed for a speed of 25 miles per hour. This policy was discarded and curves are now super-elevated to provide for the legal speed limit of 35 miles per hour. The maximum rate of super-elevation of 1 inch per foot of width is used for all curves having a radius less than 1,000 feet.

(c) *Special Provisions.*—The standard specifications were modified considerably by a set of printed special provisions issued July 1. Prior to the adoption of these, numerous mimeographed sheets covering special provisions affecting the work had been used. This manner of handling special provisions was not entirely satisfactory and the subject matter contained in these sheets was enlarged, revised, clarified and printed in convenient form.

5. PAVEMENT CROSS SECTIONS.—The standard pavement cross sections in use during 1928 are shown in Figures 4 and 5. The 18-foot pavement width was used on the majority of the work placed under contract. The 20-foot width was used near the larger centers of population where heavy truck traffic is anticipated. While Figures 4 and 5 show 18-foot widths only for the bituminous-concrete and bituminous-filled brick pavements, alternate bids were received for the same widths in these types as for portland cement concrete.

6. GRADE SEPARATIONS.—Dangerous grade crossings existing on the State-wide system have been eliminated wherever possible. Wherever practicable locations are selected which will avoid the crossing of railroads, but if it is necessary to cross, an effort is made to separate the grades. In such cases it is required by statute that an order be obtained from the Illinois Commerce Commission, which has jurisdiction. Matters relating to grade separations are often difficult to adjust and frequently much time is consumed in arriving at a satisfactory agreement. As a matter of policy an attempt is made to reach an agreement with the railroad company involved concerning the construction details of the project and the division of costs before presenting the matter to the Commission. Eighty-eight separations have been completed on the State-wide system of hard-surfaced roads, exclusive of those which existed prior to the construction of the new roads. The separations completed during 1928 are shown in Table V.

During the year, orders have been secured from the Illinois Commerce Commission for the 24 separations listed in Table VII. One of these was completed during the year and the others are in various stages of construction. Negotiations are under way for a number of other projects for which agreements will probably be concluded during the coming year.

7. FEDERAL AID.—Under the provisions of the Federal Highway Act and amendments thereto, certain allotments of funds are made to the various states for the purpose of constructing Federal aid roads. All allotments which have been made to the State of Illinois are tabulated in Table VI. The status of these funds, that is, their position with relation to final consummation, is set forth in Table VIII. This table shows the four steps in Federal aid procedure. The first, or project statement stage, is that in which funds are obligated by preliminary statements. The amounts shown for this stage are, therefore, approximate. The second, or project agreement estimate stage, is that in which the contact has been awarded, actual unit costs received, but no agreement executed with the Federal Government with respect to the share of the cost which it will assume. The third, or project agreement stage, is that in which an agreement has been made with the Federal Government as to its share of the cost and as to construction details. The sum of the amounts shown in these three stages is the approximate Federal aid to be received on uncompleted projects. The fourth, or completed work stage, shows the Federal aid actually received.

8. REFUNDS TO COUNTIES AND MUNICIPALITIES.—The $60,000,000 and $100,000,000 State-wide Acts provided that certain refunds be made to counties for improved roads utilized and made a part of the State-wide system. Subsequent action by the Legislature provided that certain refunds be made to municipalities for city pavements constructed to connect bond issue roads built to the corporate limits. The status of these refunds is taken up in the following paragraphs.

(a) *Refunds to Counties.*—In the case of counties, the Acts provided that a refund may be made to counties for roads which have been utilized and made a part of the State-wide system, provided: that these paved roads were constructed entirely or partly by the county, and accepted by the State; and that the amount refunded be expended on either retiring outstanding county bonds issued to improve State aid roads or for constructing durable hard-surfaced roads on the State aid system under the direction and to the satisfaction of the Department of Public Works and Buildings. The mileage and amounts so refunded to the various counties to December 31, 1928, are shown in Table IX.

(b) *Refunds to Municipalities.*—Prior to the enactment of legislation providing for construction within cities of more than 2,500 population, a number of them had, at their own expense, constructed pavements to connect $60,000,000 bond issue roads built to the corporate limits. The Fifty-fourth and Fifty-fifth General Assemblies made appropriations to refund such cities the cost of these pavements, provided: that the population was less than 7,500; that the residences along the street averaged more than 200 feet apart; that the pavement was built subsequent to January 1, 1921, and subsequent to the time work was started on the State bond issue road adjacent to the corporate limits; that the pavement followed the most feasible route through the city; and, that the pavement be deemed satisfactory by the Department as to type, width, thickness, strength and smoothness. An opinion has been rendered by the Attorney General of the State to the effect that a pavement must have been constructed prior to July 1, 1925, the date that the State was granted the right to pave through cities on the $60,000,000 State-wide system whose population exceeded 2,500, before it is eligible for refund under this legislation. Claims for refunds have been filed by a number of cities. In each case, a careful investigation has been made to insure that the pavement in question met the conditions of the law before a refund has been made. During 1928, refunds were made to eight cities, covering a total of 3.106 miles of pavement and a cost of $89,795.19. In addition, several pending claims were under investigation. The refunds which have been made up to December 31, 1928, are listed in Table X.

9. STATE AID SYSTEM.—The State aid system of inter-county roads is composed of the more important roads in each county. The Road and Bridge Laws provide that State aid roads which have not been improved by the counties and taken over by the Department of Public Works and Buildings shall be under the jurisdiction of the various counties and that the counties shall be responsible for their upkeep. Counties of the first class are permitted to designate 20 per cent of the total public road mileage as State aid roads. Counties of the second

class may designate 25 per cent, and counties of the third class 50 per cent. If it is desired to make changes in the State aid system, the county board of supervisors must pass a resolution specifying the changes under consideration and requesting their approval by the State. Upon approval of this resolution, the official State aid map on file in Springfield and a copy of it in the hands of the county clerk are altered to agree with the resolution. Many changes are requested each year, each of which must be investigated by the State before approval. The mileage of State aid roads in the various counties as of January 1, 1929, is shown in Table XI.

B. BRIDGE SECTION.

1. DUTIES.—The duties of the Bridge Section of the Bureau of Design include the preparation of plans and estimates of cost of all drainage structures on the State bond issue system; the preparation of plans and estimates for structures to be built under Section 15d, or checking the same if prepared by the county superintendent of highways; the checking of shop drawings and the shop inspection of fabricated structural steel for steel structures, either State or county; and the preparation of specifications governing the design and construction of all highway bridges within the State. In addition, this section renders to the counties and townships a general consulting engineering service on all phases of bridge design and construction. When requested to do so by the proper officials, it also prepares plans and estimates for bridges to be constructed and paid for entirely by the counties and townships.

2. WORK ACCOMPLISHED DURING 1928.—A summary of the work accomplished during 1928 is as follows:

(a) *Bridge and Culvert Plans Prepared.*

Unit.	Number.	Estimated Cost.
Counties and Townships	109	$ 574,127.00
State (Separate Contracts)	481	7,116,879.93
State (Included in Road Contracts)	14,118	4,245,790.34
Totals	14,708	$11,936,797.27

(b) *Bridge and Culvert Contracts Awarded.*

Unit.	Number.	Contract Cost.
Counties and Townships	102	$ 240,808.94
State (Separate Contracts)	461	6,296,999.39
Totals	563	$6,537,807.43

In addition, shop drawings for 69 steel bridges were checked and approved; the fabrication of 53 steel bridges was inspected; plans for 1,749 bridges and culverts prepared by county superintendents of highways were checked and approved, and three existing bridges were analyzed for strength.

During 1928 Illinois established a new record for a single year's construction of concrete pavements. The construction of bridges was carried on with the same intensity as the construction of pavement. The summary given above shows that plans were prepared for 14,599 structures on the State bond issue system, having an estimated cost of $11,362,670.27. This was practically double the output of any preceding year. The separate contracts let for bridge work on the State system totaled $6,537,807.43. The nearest approach to this figure occurred in 1923 when the total value of separate bridge contracts awarded was $3,170,269.46.

The largest single contract awarded was for the bridge across the Illinois River at Pekin. The total contract price, including two approaches, was $529,599.59. When completed it will have three reinforced concrete spans of 43 feet each, two steel spans of 100 feet each, four steel spans of 180 feet each, and a vertical lift channel span of 260 feet. The overall length of the bridge will be 1,324 feet. The roadway will be 24 feet wide, with a 5-foot sidewalk on the south side. Construction work is now well under way and it is expected that the entire bridge will be completed before the close of the construction season of 1929.

The original contract awarded in 1926 for the Illinois River bridge at LaSalle did not include the towers, operating machinery and fender piers for the 260-foot channel span. Navigation requirements of the Federal Government made it necessary to award a contract for these items in 1928. The total contract cost was $128,685.50.

The next largest contract awarded was for the east approach to the bridge across the Illinois River at Florence. It was found to be practically impossible to secure material for an embankment at a reasonable cost. Therefore, plans were prepared and contract awarded for a reinforced concrete pile trestle consisting of twenty-eight spans of 43 feet 6 inches each. The total contract price was $114,694.17. The construction consists of steel beam spans with concrete floor slabs and hand rails, supported upon reinforced concrete pile bents. Figure 6 shows the pile bents in place and the steel being erected. This type of construction is somewhat cheaper than using solid masonry piers, and it has the further advantage that the concrete piles can be driven under conditions which would be unfavorable to work requiring excavation. This type is not recommended for small bridges or for use immediately adjacent to stream channels, but for overflow openings of large streams where a number of spans are required, it offers the possibility of some saving in cost and time required for construction.

3. GRADE SEPARATIONS.—The grade separation program described in the report of the Road Section of the Bureau of Design involved a considerable volume of design work in the Bridge Section. The railroads prefer to design all structures which carry their tracks, and it has been the policy of the Division to design all separation structures which carry highway traffic, let the contracts, and supervise the construction. The amount of such work accomplished during 1928 is shown in Tables XII, XIII and XIV.

4. RECORD OF BRIDGE WORK—1906 TO 1928.—A summary record of the plans prepared and contracts awarded for drainage structures from 1906 to 1928 is given in Table XV. This record, however, includes only the structures let under separate contracts. There were, of course, thousands of other structures let as a part of pavement and grading contracts but it was not feasible to include them in Table XV, because of the large number of small structures involved and the diffi-

culty of segregating cost data for each individual structure. This table is interesting in that it indicates the steady progress of highway development in Illinois since 1906, when the State Highway Department first began to operate. During that year an insignificant amount of bridge work was designed and placed under contract when compared with modern accomplishments. In 1913 the State Act became operative and immediately there was an increase in the volume of work. Then in 1920, work on the State bond issue and Federal aid roads was started and has continued to the present time. The accomplishments during 1924 and 1928, when record-breaking pavement programs were completed, also stand out in the bridge work accomplished as shown by this table.

5. DESCRIPTION OF PHOTOGRAPHS.—Figure 6 shows the east approach to the bridge over the Illinois River at Florence. The details have been explained in a previous paragraph.

Figure 7 shows the stage of construction on the Illinois River bridge at Florence in September, 1928. In the foreground appear two spans of 215 feet each, at the west end of the bridge, with all steel erected and ready to receive the concrete floor.

Figure 8 shows the structure which carries Route 2 over the tracks of the Illinois Central Railroad at Cobden, Union County. The span is 111 feet between end bearings and the roadway width is 24 feet, with a 5-foot sidewalk. Total cost, $26,014.05.

Figure 9 shows a good example of reinforced concrete construction. This is over Smallpox Creek in JoDaviess County on Route 5. It has three spans of 55 feet each on center line, skewed 45 degrees, and a 22-foot roadway. The contract price was $27,268.16. The open concrete rail and good workmanship add quite materially to the appearance of the structure.

Figures 10 and 11 present the old and new bridges over the Big Muddy River east of Murphysboro on Route 13. The old bridge, built in 1895, was replaced by the new structure in 1926. The new bridge has two steel spans, one of 200 feet and one of 80 feet, and one concrete deck girder span of 40 feet. Roadway width, 22 feet. Contract price, $52,815.19.

Figure 12 shows the bridge which carries Route 29 over the Hennepin Canal at Bureau. This is a steel plate girder, having a span of 84 feet, and a 24-foot roadway. Contract price, $23,808.36. The unfinished piers and temporary approaches are to serve until a grade separation is affected with the Rock Island Railroad just to the north, at which time this span will be raised and become a part of the larger structure.

Figure 13 shows a grade separation at Gardner which carries Route 4 over the tracks of the Chicago and Alton Railroad. The track span, 86 feet long, is a steel plate girder and when completed will be encased in gunite. It will then have the same appearance as the 52-foot concrete spans on each end. The roadway width is 24 feet. Total contract price, $28,766.97.

Figures 14 and 15 show the bridge over Big Bay Creek on Route 34 at Elizabethtown. This bridge has a central span of 200 feet with a 70 foot span on each end. The roadway width is 22 feet. The contract price was $53,206.91. Figure 14 shows the erection of the 200 foot span and Figure 15 the completed structure.

III. BUREAU OF CONSTRUCTION.

1. DUTIES.—The duties of the Bureau of Construction include the following activities: The formulation of construction policies for coordinating the work of the nine highway districts; the general inspection of field work; the supervision of the operation of State-owned construction outfits; the allocation of cement purchased under State contract; the checking of freight rates on construction materials used on contract work; the handling of payment estimates, final inspection, and acceptance of contract work; the compilation of statistical data relative to work constructed; and the direction of the distribution of crushed rock from two State penitentiary quarries.

The detailed inspection of construction work is carried on under the general direction of the District Engineer through resident engineers and inspectors located on each job, supplemented by constant general inspection by the District Engineer and his assistant in charge of construction. In addition, the Engineer of Construction, located in Springfield, and his assistant make regular inspection trips throughout the State, visiting each job one or more times throughout the season, which supervision includes final inspection of completed work. Work constructed by the counties under Section 15d is handled by the county organizations, but it is given sufficient general supervision through the district offices to insure standards of construction equal to those required by the State on its own work. The Engineer of Construction acts for the Chief Highway Engineer in settling differences which arise between the contractor and the field engineers; in interpreting the terms of the contract and the specifications; in studying the ability of each contractor to perform the work he has contracted for; and in checking the progress made on contract work.

2. WORK ACCOMPLISHED DURING 1928.—The volume of work accomplished during 1928 exceeded that accomplished during any previous year in the history of the Division of Highways. A total of 1304.75 miles of pavement was completed, consisting of 1262.93 miles of concrete, 28.11 miles of brick surface laid on a concrete base, 0.09 miles of asphaltic concrete, and 13.62 miles of gravel surface. Of the 1304.75 miles, the State constructed 1075.27 miles on the State bond issue system, and the counties constructed 229.48 miles on the State-aid system under Section 15d of the State Aid Law. The previous record for a season's accomplishments was made during 1924 when 1229.5 miles of pavement of all types were completed. If rigid-type pavements only are considered, no season's accomplishment greater than the 1229.5 miles completed during 1924 by Illinois has ever been reported by other states or foreign countries according to official records made public from time to time, and this mileage has been considered as a world's record. Therefore, the construction of 1304.75 miles during 1928, of which 1291.13 miles was strictly rigid-type pavement, establishes a new record for this type of pavement. A summary of the mileage of the various types of pavement constructed during 1928 is shown in Table XVI.

In addition to the pavement, there were completed 340.25 miles of heavy grading consisting of 8,093,683 cubic yards of earth work, and 360 bridges involving 133,835 cubic yards of concrete.

The outstanding features of the 1928 program included a large construction and widening program in Cook County carried on by both the State and the county; the construction of 33.10 miles of wide pavement on the State bond issue system outside of Cook County; and the completion of a greater volume of grading and bridge work than that completed during any previous year. Table XVII is a summary showing the amount of work under contract and completed during 1928, the amount remaining uncompleted at the end of the year, the number of contractors working, and the number of sections under contract.

3. DISCUSSION OF CONSTRUCTION DATA.—Each season data relative to progress, output, and other features of construction work are collected which bring out some interesting points.

Figure 16 shows the average daily output of concrete pavement in square yards from 1921 to 1928, inclusive. In 1921 the average daily output was about 640 square yards per day. This increased to about 1,100 square yards in 1924, indicating the perfection of methods and equipment during this period. From 1924 to 1927 the average daily output remained practically the same, indicating stabilization, but in 1928 it was increased to 1,400 square yards. The increase during 1928 was no doubt brought about by the ability of the contractors to anticipate a large program in advance, thereby permitting expansion to the maximum output. The general increase in output from 1921 to 1928, of course, has gone hand in hand with practically uninterrupted large yearly programs, making it possible for the contractor, equipment producers, material producers, and railroad officials to study their problems and provide the means whereby expansion could be accomplished.

Figure 17 shows the monthly output of payment estimates. During the year, a total of 3,913 estimates of all kinds were passed, including monthly payment estimates, semi-final estimates, final estimates, and supplementary final estimates. The number of estimates handled during the year is indicative of the amount of engineering and clerical work involved, since each estimate must be carefully checked and verified before it is passed for payment.

Figure 18 shows the weekly construction progress during 1928. The average production from May 3 to November 1 was 46.3 miles per week. The maximum mileage produced during any single week occurred during the week ending August 16th, when more than 70 miles were built. The fluctuations in this curve probably indicates unsuitable weather conditions. In Figure 19 the production during 1928 is compared with that of previous years.

For several years it has been the practice to analyze the unit costs for a number of typical sections of work selected from various parts of the State, in order that a cost basis may be established for comparative purposes. The analysis includes all expenditures made on these sections of work. If the heavy grading and bridge work was done in advance of the pavement, all of this cost is included, as well as the cost of the cement which is furnished by the State. The analysis covers 1,091 miles of 18-foot concrete pavement selected as follows from work performed during the period 1922 to 1928, inclusive: 1922, 126 miles; 1923, 114 miles; 1924, 113 miles; 1925, 203 miles; 1926, 197 miles; 1927, 125 miles, and 1928, 213 miles.

The average cost per mile is $30,095.78. Figure 20 shows the cost distribution of each $1.00 expended on the 1,091 miles mentioned. The item marked "Miscellaneous" includes catch basins, section markers, gutters, and extra work not included under the headings shown on the diagram. Figure 21 shows the cost distribution of each $1.00 expended on 213 miles selected to represent the year 1928. The average cost, including all items of cost, was $28,990.33 per mile. There is a close agreement between the unit cost shown on this diagram and those shown on the diagram in Figure 20 representing the average unit cost for the seven-year period.

4. CONSTRUCTION POLICIES.—There were no radical changes in construction policies during 1928. As in past years the quality of the concrete was given constant attention. Cores were taken from each section before final acceptance, and because of the increased program, an extra core drill was placed in operation. Approximately 8,400 cores were taken. Primarily these cores are taken for the purpose of determining whether proper thickness of slab has been obtained. When this has been determined, the cores are forwarded to the Bureau of Materials at Springfield where they are tested for quality. The practice of taking cores on each section was adopted in 1925, so that the Division of Highways now has thousands of core tests as a check on the quality of the concrete in the bond issue roads.

A new policy designed to secure better quality of concrete in bridge footings was adopted during 1928. In the past our specifications have required for this purpose concrete made in the proportions of 1:2½:4. These proportions were changed to 1:2:3½ in order to obtain higher ultimate strength concrete for this work. In addition, a study was started for the purpose of gathering data as to the strength of the concrete we are actually getting in our bridges. On pavements we determine quality by means of cores, but it is not practical to take cores from bridges. It is possible, however, to take cylinder test specimens from the concrete being used. A number of typical bridge jobs throughout the State were selected and 6″x12″ test cylinders were made. These are being shipped to the Bureau of Materials at Springfield, where they will be tested for quality. The results should give positive information as to the quality actually being obtained and this information will be valuable as a basis for checking our bridge design specifications.

A new type of portable testing machine for testing concrete beams taken from the pavement was placed in operation. This machine was designed by the Bureau of Materials and is described more fully in its section of this report. For the present at least this machine is used only for checking the quality of the pavement concrete, although in a few special cases it was used to determine the date on which new pavements could be opened to traffic. This apparatus is valuable in that it gives a quick test of the quality of the concrete and removes any doubt in the minds of engineer or contractor as to the quality being obtained. It is expected that this test will come into more general use as time goes on and that pavements will be opened to traffic on the basis of the results of strength tests rather than an arbitrary time limit.

Early in the season of 1928 a new manual of instructions to field engineers was prepared and placed in the hands of each resident engineer and inspector. This manual outlines standard practice for all phases of pavement and bridge construction, and summarizes circular letters of policies for construction which have particular reference to the activities of the engineers in the field and to construction practice. It has served a valuable purpose, particularly at a time when it was necessary to employ a large number of new engineers to handle the increased program.

During the latter part of the season, a policy was adopted of placing 4-inch transverse expansion joints in the pavement at intervals of 800 to 1,000 feet, as described in the report of the Bureau of Design.

5. CEMENT SHIPMENTS.—On April 3, 1928, the Department of Public Works and Buildings called for bids on the quantity of cement needed for the 1928 construction program. Bids were asked for furnishing 4,200,000 barrels, and 21 competing companies offered a total of 14,604,000 barrels. Ninety-five per cent of the cement contracted for was actually shipped during the season, a record never previously attained.

Figure 22 shows the cement shipments made during the years 1924 and 1928, the two years during which the Division of Highways accomplished its greatest construction programs, and these graphs afford an interesting comparison. From the curve showing the accumulative totals, it will be seen that in 1924 more than 1,500,000 barrels of cement had been shipped by the end of May. Only a little over 500,000 barrels were shipped during 1928 over the same period of time. This difference is accounted for by the fact that in 1924 it was necessary to store a considerable quantity of cement in advance of beginning construction operations, due to the inability of the cement companies to furnish the required quantity of cement during the construction months only, and to the inability of the railroads to handle its transportation. During the four-year interval, the efficiency of both the cement manufacturing industry and the transportation facilities had so increased that it was not necessary to store cement on the job in any appreciable quantities. In fact, during 1928 it was not unusual for a car of cement to leave the mill one day and arrive on the job ready for unloading the next morning, even though an interchange of railroads may have been necessary. For the past two or three years contractors have not found it necessary to maintain more than five or six cars of cement in storage at any one time during the construction season. It is interesting to note how the cement curves shown in Figure 22 follow the production curves shown in Figures 17 and 18.

6. CONSTRUCTION WITH STATE-OWNED OUTFITS.—During 1928 four State-owned construction outfits were operated under the direction of the Superintendent of Day Labor. These State-owned outfits are not operated for the purpose of competing with contract work. There is always a certain amount of work which cannot be done economically by contract, and these outfits afford a means whereby this work can

be accomplished. Furthermore, there must be some means of judging whether the bids received for contract work are reasonable. Records of the actual cost of contract work are difficult to obtain, and the cost records of the State units furnish this information. Methods of construction are constantly being changed and new methods proposed, and it is necessary to know the effect these new methods will have on cost before they are used on contract work. These units furnish the means whereby this can be ascertained. In many cases immediate construction is almost imperative and there are contingencies which cannot be estimated, such as right-of-way difficulties, changes due to the presence of public utilities, and other conditions which prevent complete and definite designs prior to starting work. Contracts let under such conditions inevitably result in large bills for extra work and sometimes in litigation. Such difficulties are most successfully met by the use of State-owned paving outfits. Frequently these are sections of work which are very difficult to build and on which it is almost impossible to obtain reasonable bids because of the risks which a contractor must assume. Some of these projects are long distances from railroad transportation, materials and water are hard to obtain, and the topography of the country is rough. On such jobs the State can do the work at the least cost, because it does not have to insure itself against possible loss in the manner which the contractor must do when he submits his bid. Quite often these difficult jobs are built very reasonably and many thousands of dollars are saved.

These State units also provide the means of carrying on many important research projects under actual field conditions which often result in indicating the means whereby large savings can be affected and the quality of the work involved assured and safeguarded. During the season of 1928 one of the State units was converted into an outfit for proportioning materials by weight, and the Bureau of Materials conducted an investigation of this method of proportioning, making a careful study of the method of proportioning, the strength of the concrete, and the uniformity of the mix. The data obtained will be of value in determining the future policy in connection with this method of proportioning aggregate.

Table XVIII shows the work accomplished during the season of 1928 by the four State units. In spite of the present low prices of pavement work built by contract, the operating cost of State units were very satisfactory. During the year an analysis of the day labor cost was made and this has furnished some interesting and valuable facts as to the unit cost prices of construction work.

7. MILEAGE OF PAVEMENT AVAILABLE FOR TRAFFIC —Table XIX shows the mileage of pavement which was available to traffic in each county on January 1, 1929. This mileage is arranged according to the classification under which it is built; that is, State bond issue, Federal aid, State aid, or County 15-D. The mileage shown under the columns headed "State Bond Issue" and "Federal Aid" make up the State trunk line system. The Federal aid system in Illinois is coincident with the State bond issue system. In general, the pavements shown under the headings "State Aid" and "County 15-D" are not connected to form a unified system, except in three or four counties.

8. DISTRIBUTION OF STONE FROM STATE PENITENTIARIES.—During 1928 a large percentage of the tonnage of stone produced at the State penitentiaries at Joliet and Menard was used for State bond issue construction and maintenance. As a consequence, only a small amount of this material was available for the use of the counties and townships. As in the past, the demand for this material was far in excess of the supply. The development of a trunk line system of durable, hard-surfaced roads in this State has brought about an appreciation of the value of the all-year roads on the part of the general public. As a result, the smaller political units are attempting to construct roads which will be available for traffic under all seasonal conditions. Due to their limited finances, however, they are obliged to seek the materials which can be obtained at the least cost, and naturally they turn to the State penitentiaries as a possible source of supply. The number of township applications at both penitentiaries indicates more than ever the possibility which lies in the development of this State activity, and it is safe to state that if the stone were available, the requests would increase very appreciably. Table XX shows the quantity of crushed stone shipped from Joliet and Menard penitentiaries during 1928.

9. DESCRIPTION OF PHOTOGRAPHS.—On the following pages a number of pictures of various phases of road activities are shown.

Figure 23 shows a typical paving unit of ten years ago. Figure 24 shows a modern paving unit using the industrial railroad method of transporting aggregates from the proportioning plant to the mixer. These two pictures afford an interesting study in the development of the road-building industry, especially in the method of handling the materials.

Figure 25 shows a modern earth moving outfit, utilizing a steam shovel and motor-driven hauling equipment.

Figure 26 shows the method of preparing the subgrade and testing it for proper depth.

Figure 27 shows a subgrade completed to the full depth and the method of attaining final compaction just ahead of the mixer.

Figure 28 shows a method of constructing 40-foot pavements. On this job the pavement is constructed in two sections with the concrete mixer entirely off the subgrade during the construction of the first half. When the adjoining section is laid, the trucks and mixer operate on the finished portion when it has attained the required strength.

Figure 29 shows the first step in curing pavement. Strips of burlap are placed on the concrete and these are saturated with water. The burlap is allowed to remain until the concrete has taken its final set, after which calcium chloride is applied.

Figure 30 shows the method used in laying a concrete base and curb for brick pavement.

Figures 31 and 32 show the old and new subways under the tracks of the Pennsylvania Railroad at Maroa, Illinois, on State Bond Issue Route 2.

Figures 33 and 34 show before and after views of a separation of grades between Route 32 and the Vandalia Railroad, near Lovington.

Figure 35 is a view of a portion of Route 39 before construction and Figure 36 the completed project, showing the improved alignment resulting from the relocation of a bridge.

Figure 37 is a view of a portion of Route 39 before construction and Figure 38 the completed project, showing the improved alignment resulting from a relocation which also eliminated a railroad grade crossing.

Figure 39 shows an outlet for a lip curb section on State Bond Issue Route 9.

Figure 40 shows a completed section of pavement on Route 2, adjacent to the Rock River between Dixon and Rockford.

IV. BUREAU OF MATERIALS.

1. DUTIES.—The duties of the Bureau of Materials include the inspection of all materials used in the construction and maintenance of roads and bridges built by the State; the inspection of materials used in the construction of roads and bridges built by the counties under Section 15d of the State Aid Act; the inspection of materials used by the counties and townships in work not under State supervision, when requested; the investigation of new materials, methods of test, and methods of pavement design and construction; the storage and distribution of all paint used in State construction and maintenance work; the preparation of specifications; the handling of the photographic work of the Division; and other work incidental to materials and tests.

The organization of this Bureau differs from that of the other bureaus in that it does not work directly through the district organizations. Whenever possible, all materials are inspected at the origin and the field forces performing this work at the plants report directly to the Engineer of Materials. However, for convenience in handling the work and for the assistance of the district organizations, a materials engineer is stationed at each district office.

The extensive construction programs which have been carried on during the past few years have required that large quantities of materials meeting the specifications be available and that they be supplied as rapidly as needed. This has required accurate knowledge of the various sources of highway materials and the maintenance of an inspection system which would afford efficient service to the producers and contractors. The Bureau has assisted in the development of new material resources whenever possible, has devoted considerable time to the study and development of tests for determining the quality of the materials, and to the development of specifications which insure the use of suitable materials.

2. GENERAL OFFICE.—The increased volume of inspection work carried on during 1928 brought about a corresponding increase of work in the general office, but the system of handling the correspondence, data, and reports of tests, previously perfected made it possible to handle this work promptly without an increase of the personnel.

3. LABORATORY INSPECTION OF MATERIALS.—The chemical and physical laboratories are equipped to make complete tests of nearly every type of highway material, as well as tests of the concrete used in the construction work. A total of 11,447 samples were tested in these laboratories during 1928. The samples tested generally fall into one or more of the following classes: Preliminary samples, acceptance samples, check samples or quality samples.

a. Preliminary Samples.—This class of samples consists of specimens submitted by manufacturers and producers to secure information concerning the suitability of their products for State work, or to show the quality of their products when bidding for State contracts. Acceptance of preliminary samples is never construed as acceptance of future shipments of the materials, but the work done on this class of samples has been the means whereby material resources have been developed and delays avoided in the purchase of quality products for State work.

The following tabulation shows the number of preliminary samples tested in the Springfield laboratories during 1928 and the distribution of the work on these samples:

Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Aggregate		44		44
Asphalt	4			4
Calcium chloride	1			1
Paint materials	28			28
Road oils	4			4
Tar-pitch-creosote	2			2
Miscellaneous	4	22	3	29
Total	43	66	3	112

b. Acceptance Samples.—This class of samples consists of representative samples of materials which have arrived at the construction site without previous inspection; materials which cannot be inspected in the field on account of the intricate nature of the chemical and physical tests required; or materials which are to be shipped from plants or warehouses in quantities which would not warrant inspection at the source. Trained engineers, employed by the State, secure these samples and send them to this Bureau for examination. The work done on this class of samples has protected the interests of the State with a minimum of expense and loss of time.

The following tabulation shows the number of acceptance samples tested in the Springfield laboratories during 1928 and the distribution of the work on these samples:

Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Asphalt	53			53
Calcium chloride	51			51
Cement		190		190
Gasoline	5			5
Lubricating oil	254			254
Paint materials	50			50
Road oils	287			287
Steel		109		109
Tar-pitch-creosote	31			31
Water			95	95
Miscellaneous	191	86	11	288
Total	922	385	106	1,413

The following samples tested for the Illinois Department of Purchases and Construction are included in the tabulation above: Cement, 2; lubricating oil, 238; paint materials, 12, and miscellaneous, 9. They were charged for this service at actual cost.

c. Check Samples.—This class of samples consists of representative samples of materials which have been stored for a considerable length of time or stored in an unapproved manner; materials which do not appear satisfactory when received on the work; or samples used to check the quality of the products of manufacturers and producers, or to check the inspection work of the plant inspectors, such as samples of cement received at frequent intervals from the different cement mills for check tests on the chemical and physical properties of the material produced at these mills.

The following tabulation shows the number of check samples tested in the Springfield laboratories during 1928 and the distribution of the work on these samples:

Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Asphalt	23			23
Calcium chloride	16			16
Cement	1,058	702	590	2,350
Tar-pitch-creosote	2			2
Miscellaneous	19			19
Total	1,118	702	590	2,410

d. Quality Samples.—This class of samples consists of representative specimens of the products of the various manufacturers and producers of highway materials. They are subjected to detailed tests in order to secure more complete information regarding the quality of the materials than is brought out by the regular plant inspections, and to secure more complete information concerning the quality of the products of the various producers. These samples are also used for the study and development of quality tests. The majority of these detailed quality tests are conducted during the winter months in anticipation of the next construction season and because of the fact that since the regular testing work is greatly reduced at this time, the testing equipment and men are available for this kind of work.

Quality tests have been made each winter since 1924, on samples from the various sand and gravel plants and from the various stone quarries, making shipments for construction work in Illinois. During the winter of 1928, the data secured by these tests was compiled in such a manner that detailed information regarding the material produced at each plant is now available.

The following tabulation shows the number of quality samples tested in the Springfield laboratories during 1928 and the distribution of the work on these samples:

Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Aggregate		291		
Asphalt	11			11
Bridge cylinders		518		518
Cement	83		160	243
Lubricating oil	6			6
Paint materials	8			8
Pavement cores		6,400		6,400
Miscellaneous	35			35
Total	143	7,209	160	7,512

The following tabulation shows the quantity of materials accepted by the Springfield office during 1928 on the basis of tests on representative samples:

Material.	Quantity.
Asphalt	2,770,000 lbs.
Calcium Chloride	3,503,000 lbs.
Cement	36,755 bbls.
Lubricating Oil	3,725 gals.
Paint Materials	39,500 gals.
Road Oils	2,870,000 gals.
Steel	779,312 lbs.
Tar-Pitch-Creosote	125,000 gals.

Two hundred forty barrels of the cement shown above were tested for the Department of Purchases and Construction.

4. PLANT INSPECTION OF MATERIALS.—When manufacturers and producers are shipping appreciable quantities of their products, inspection is carried on at the source of the materials by inspectors trained and employed by the Bureau of Materials. In instances where it is practicable, a single inspector covers the work at more than one plant. The placing of inspectors, however, is such as to give the best service to the producers and contractors with a minimum of expense and loss of time. In general, it might be said that plant inspection expedites the work of the contractors by preventing the shipment of unsatisfactory materials to the work and consequent delays attending their disposal; protects the producer from losses which would occur through rejections at destination; reduces the cost of the materials by providing for more efficient plant operation; and provides better control of quality, thereby assisting in the maintenance of the high construction standards. The quantity of materials accepted at plants for highway work in Illinois

and the unit costs of inspection for the calendar year 1928 are shown in Table XXI. The quantity of materials inspected for other departments of the State of Illinois and for other states during 1928 are shown in Table XXII. A comparison of the data given in these tables with that of former years shows that for each type of material, the quantity inspected during 1928 practically doubled the quantity inspected in any other year and in most cases was greater than the quantity inspected during the last two years. Unit inspection costs for this work also showed a marked decrease for the calendar year 1928 as compared with former years.

Detailed reports of the 1928 plant inspection of the various materials listed in Table XXI are given below:

a. Aggregates.—The following quantities of aggregates were accepted:

Account.	Material.	Quantity.
State of Illinois—		
Division of Highways	Sand	1,570,727 cu. yds.
Division of Highways	Gravel	1,644,211 cu. yds.
Division of Highways	Crushed Stone	1,139,130 cu. yds.
Division of Highways	Stone Screenings	7,570 cu. yds.
Division of Highways	Rip Rap	4,848 cu. yds.
Division of Highways	Novaculite	2,775 cu. yds.
Division of Waterways	Pit Run Gravel	109,501 cu. yds.
Total		4,478,762 cu. yds.

The following quantities of aggregates were rejected: Sand, 42,434 cu. yds.; gravel, 55,100 cu. yds., and crushed stone, 13,372 cu. yds., making a total of 110,907 cu. yds.

To inspect this material, plant inspection was maintained at ninety-two sand and gravel plants and thirty-two crushed stone plants, making a total of 112 plants. Approximately 45,000 samples were required to complete the inspection work and in addition to making a mechanical analysis determination and a test for the silt and clay content of each of these samples, the inspectors were required to make a report in triplicate on each car load of the material. The number of inspectors required to carry on this volume of work varied in accordance with the construction activities, the maximum number in the field at any one time being fifty-eight. The unit cost for this work was considerably lower than for any former years.

b. Asphalt.—Plant inspection was carried on at four refineries and a total of 9,957,348 pounds of asphalt were accepted for State work during 1928. This figure does not indicate the amount of inspection work necessary for the acceptance of such a large quantity, however, as asphalt is inspected during the process of manufacture. This method gives the refinery an opportunity to correct the material before it leaves the still in case the preliminary tests show unsatisfactory materials, but at times many tests are required before the material is brought to a satisfactory state. In addition to making these tests, the inspectors check the lot and batch numbers when the material is loaded into the cars. Asphalt inspection does not require full time inspectors; therefore, engineers are sent out from the Springfield laboratory whenever this work is necessary. Only three men were in the field at any one time during 1928.

c. Cement.—The following quantities of cement were accepted:

Account.	Quantity,
State of Illinois—	
Division of Highways	4,904,968 bbls.
Department of Public Welfare	10,836 bbls.
Division of Waterways	111,883 bbls.
State of Iowa	83,418 bbls.
State of Michigan	2,772 bbls.
State of Missouri	462 bbls.
Total	5,114,339 bbls.

To inspect this material, plant inspection was maintained at nineteen cement plants located in Illinois, Indiana and Missouri. Approximately 255,717 samples were required. These samples are taken from the loaded cars and tested individually for soundness and setting qualities. If a single sample fails or shows the slightest indication of unsoundness or irregularity in setting properties, the entire car from which this sample was taken is rejected. In addition, a composite sample representing the contents of each car is tested for strength at 7 and 28 days and for fineness of grinding. The number of inspectors required to carry on this work varied throughout the year, the maximum number at any one time being forty.

d. Lumber.—The following quantities of lumber were accepted:

Material.	Quantity.
Treated and Untreated Lumber	320,347 bd. ft.
Piling of Different Species	1,128,756 bd. ft.
White Cedar Guard Fence Posts	601,718 bd. ft.
Total	2,050,821 bd. ft.

To inspect this material, inspection was carried on at various creosoting plants and construction sites in Illinois, at several yards in St. Louis, and at points in Wisconsin and Alabama. Lumber inspection differs from the inspection of most other highway materials as the lumber inspector examines each piece instead of a sample representing a certain quantity. The inspection of creosoted material at the creosoting plant enables the inspector to determine not only the quality of the lumber but the preservative treatment as well. Ordinarily, lumber inspections are carried on by the District Engineers of Materials, but where large quantities or shipments from distant points are involved, inspectors are detailed for this work, the maximum number during 1928 being two.

e. Paint.—The following quantities of paint were accepted:

Material.	Quantity.
Basic Sulphate Blue Lead Paint	20,267 gals.
Basic Carbonate White Lead Paint	15,450 gals.
Stencil Paint	112 gals.
Total	35,829 gals.

Since all of the paint used in construction and maintenance work is purchased directly by the Division of Highways and is handled by this Bureau, it is possible to maintain very rigid inspection over this material. The separate materials are first tested in the laboratory, then the plant inspector watches the grinding operations, the proportioning of the materials, weighs the mixed paint and checks the total yield of the various batches produced. Check tests are made from samples taken from the containers when they reach Springfield. The Bureau also keeps in touch with the application of the paint in the field, and if trouble is experienced, an investigation is made to determine and remedy the cause. Engineers are detailed from the Springfield laboratory for paint inspection, the maximum number at any one time during 1928 being two.

f. Paving Brick.—Plant inspection was maintained at five brick plants and 9,752,100 paving brick were inspected and accepted for highway work in Illinois during the calendar year 1928. Approximately 1,100 samples were selected by the inspectors during the loading of these brick and subjected to the rattler and other tests required.

g. Steel.—The following quantities of steel were accepted:

Account.	Inspected by Illinois.		
	In Chicago district.	In St. Louis district.	Miscellaneous mills.
State of Illinois, Division of Highways, reinforcing steel	44,153,393 lbs.	25,561,961 lbs.	1,865,855 lbs.
Structural steel—I beams, angles, channels	1,321,163 lbs.		
Wire guard fence fabric	1,090,500 lbs.		
State of Iowa (reinforcing steel)	4,117,183 lbs.		
State of Minnesota (reinforcing steel)	1,754,325 lbs.		
State of Missouri (reinforcing steel)	148,651 lbs.		
State of Tennessee (reinforcing steel)		486,800 lbs.	
State of Wisconsin (reinfrocing steel)	6,732,280 lbs.		
Total	59,317,495 lbs.	26,048,761 lbs.	1,865,855 lbs.

NOTE.—In addition to the quantities shown above, 714,297 lbs. of reinforcing steel were inspected for the Illinois Division of Highways by the Missouri State Highway Department.

To inspect this material, plant inspection was maintained at twenty-three mills and warehouses in the Chicago district, at four in the St. Louis district and at two other shipping points. The inspection of steel includes the sampling and testing of the steel in the mill or warehouse before it is loaded and the supervision of the cutting, bending and loading. All poorly rolled, undersized or otherwise defective bars are immediately rejected. The testing requires the use of special laboratory facilities. In the St. Louis district, the testing laboratories of two of the large steel companies are available, but in the Chicago district it has been necessary for the Bureau to establish a branch laboratory for the carrying on of this work. This laboratory is centrally located with respect to the several mills and warehouses and has been the means whereby the unit cost of steel inspection has been materially reduced and the quality of the inspection service considerably improved. Samples of the steel shipped from other sources are sent to the Springfield laboratory for testing.

h. Drain Tile.—During the calendar year 1928, 26,107 drain tile were inspected. These tile varied widely in size and type as for example sixty-four of the above number were concrete pipe. Tile are usually inspected by the District Engineers of Materials or their assistants at the construction sites. In some instances, however, as in the case of large orders, plant inspection is carried on by inspectors temporarily assigned to this work.

5. RESEARCH AND INVESTIGATIONS.—Several investigations already in progress were continued during 1928, and in addition other new projects dealing with pavement design, highway materials, testing and inspecting, the quality of concrete, and highway construction were carried on. Summary reports of these projects follow:

a. Pavement Design:

(1) *Design of Concrete Pavement Adjacent to Railroad Grade Crossings.*—In order to improve, if possible, the special pavement design now being used adjacent to railroad grade crossings, a thorough study of the subject was made and designs for four concrete pavement slabs ranging from 9 to 12 inches in thickness and four angles of crossing, namely: 30, 45, 60 and 90 degrees, for each thickness of pavement were made.

(2) *Design of Concrete Pavement for Metropolitan Areas.*—This investigation was instigated to develop a concrete pavement design which would be best suited to safely carry the wheel loads encountered in metropolitan areas. Six distinct types of pavement from which the most suitable design could be selected were investigated and submitted to the Bureau of Design.

b. Highway Materials:

(1) *Fine and Coarse Aggregate Investigation.*—Detailed quality tests are made each year on samples of fine and coarse aggregate taken from the various deposits furnishing State work. The samples used represented the products of the various plants making shipments for Illinois highway construction and the tests were made during the winter months. During the winter of 1928, the complete data were compiled in such a manner that detailed information concerning the products of any aggregate plant, whose product has been tested, is now readily available.

(2) *Proportioning Concrete Materials by Weight.*—During the 1928 construction season an investigation was made in the field to determine the relative merits of proportioning by weight and by volume. The State-owned paving outfit operating on State Bond Issue Route 108, Sections 101, 102 and 103, Greene County, was equipped for proportioning by weight, and throughout the construction season an engineer from the Bureau of Materials was in charge of the proportioning operations. He secured comparative data relative to proportioning by weight and volume. Sections of pavement were laid from materials proportioned by each method, paying particular attention to the quality of the materials, the proportioning, and the curing conditions. Test beams were made from the concrete taken from these sections and broken to obtain a comparison of the strength of the concrete. The variation in the weight of the batches of materials used was also recorded. From these data a report will be formulated which should give valuable data for use in connection with the revision of the standard specifications when the weight method is adopted.

(3) *Effect of Storage Conditions on the Quality of Portland Cement.*—An investigation was conducted for the purpose of determining the comparative protective value of 5-ply paper cement bags and the standard cloth bags containing portland cement and stored under conditions ranging from very poor to very good. A single brand of cement

taken from a carload shipment was used, one-half of which was packed in 5-ply paper bags and the other half in cloth bags. The cement for all specimens was stored for 0, 14, 28, 49 and 84 days. Tests were made on beams and cylinders at the age of 21 days to determine the transverse and compressive strength of concrete made using this cement; on briquettes and cylinders 21 days old to determine the tensile and compressive strength of 1:2 mortar sieved from the concrete; on briquettes and cylinders 7 days and 21 days old to determine the tensile and compressive strength of standard 1:3 standard mortar. Additional tests for each of the above storage periods were made to determine the time of set, the amount of heat generated during the setting period, the normal consistency, and the fineness and ignition loss.

(4) *Geological Classification of Crushed Rock.*—This Bureau, in conjunction with the State Geological Survey, has devised a system of classifying limestone and dolomite. This classification system furnishes detailed information concerning these materials and will furnish a means whereby the character of the crushed stone submitted for tests can be reported in a more complete and accurate manner.

(5) *Development of Method for Painting Longitudinal Bars.*—The methods generally used for painting the longitudinal bars used in the concrete pavement consist of dipping the bars in open tanks or passing them through a pipe which contains the paint. The paint used when the bars are dipped by the open tank method must be of a different consistency than that used when it is brushed on. An investigation was undertaken to determine the proper percentage of thinners to be added to basic sulphate blue lead paint to produce a suitable film thickness of the paint at various temperatures. Methods of improving the dipping tank were also studied. The method worked out seems to give more satisfactory results than the methods in use up to the present time.

(6) *Durability of Paint for Steel Structures.*—The investigation of the durability of paint for steel structures mentioned in the 1927 Annual Report was continued in 1928. The panels have been erected since April, 1926, and are now beginning to show definite results. This investigation will be continued through 1929 and will probably be concluded during that year.

(7) *Effect of Zinc Chloride on White Lead Paint.*—This investigation was undertaken to determine whether zinc chloride when applied as a wood preservative will discolor white lead paint applied directly over the preservative coating. Results are now definite enough to determine that white lead paint can be successfully used. A progress report was written during the year. This investigation will be continued through 1929.

(8) *Investigation of Several Types of Metal Posts for Signs.*—In the past the Bureau of Maintenance has used several types of metal posts in erecting signs. It was considered desirable to standardize on the type of posts used in order that the punching of the signs might also be standardized. The standardization of both the posts and the signs would permit the signs to be interchanged whenever necessary or desirable. In selecting the proper type of post it was necessary to consider the strength, durability, economy and appearance. The specimens selected consisted

of several commercial types and weights of posts together with four sizes of new pipe ranging from 1″ to 2″ in diameter and several sections of used 2″ pipe. The posts were tested as cantilevers, the length of the lever arm being about 5 feet. The load was applied in successive increments until the post was permanently deflected. The posts whose sections were such that they were not of equal strength in all directions were tested in all positions in order to determine the weakest section. Tests were also made by driving the posts into the ground to various depths and applying loads at about 5 feet above the ground and perpendicular to the posts until the bearing power of the soil was exceeded or until permanent deflection of the post occurred.

c. *Tests and Inspection:*

(1) *Method of Determining Cross-Sectional Area of Steel Reinforcement Bars.*—The cross-section of the various types of reinforcement bars now available commercially varies to such extent that it is almost impossible to measure it accurately by ordinary methods. Work was undertaken for the purpose of developing a quick and practical method suitable for use by the inspectors at the mills for determining the cross-section of any area of bars which, due to the character of the deformations or to irregular shape, are difficult of accurate measurement. A method was developed which has worked out successfully under practical conditions.

(2) *Development of Testing Machine for Determining Modulus of Rupture of Concrete.*—The design of concrete pavements on the basis of flexural strength of the concrete was developed as a result of the Bates Experimental Test Road. During the progress of this test, the value of the modulus of rupture of the concrete was obtained from simple beam tests in a Riehle Testing Machine, using 8″x12″x30″ specimens with the 8″ dimension placed vertically and loaded at the midpoint of a 24″ span. Closely associated with the Bates Experimental Road Tests was an extensive investigation on the fatigue of concrete, in which the specimens were tested as cantilever beams. The idea of testing specimens from concrete pavement as cantilever beams was developed, and an extension arm was made and first used in January, 1922, in testing beams broken in the fatigue machine to obtain the modulus of rupture of the concrete. The next step consisted of the construction of a concrete base with a suitable arrangement for holding the specimen and a more uniform application of the load until failure of the specimen occurred. This type of testing machine, however, was not practical for field use, and steps were taken toward the development of a portable machine for that purpose. During the next four or five years, this method of testing concrete became quite general, and there have been many different types of machines designed. The modulus of rupture obtained with the different types of machines varies considerably, although mathematically it should be identical. During the years 1927 and 1928, investigations were attempted with the object in view of designing a machine which would give consistent results and to determine, if possible, why the different methods of making the tests should produce such variable results. Several types of machines were designed and constructed, and finally a machine was developed which, after a thorough trial, seems to have all

of the requirements necessary to give consistent and accurate results in a simple manner. Several of these machines were constructd and placed in use in each of the nine construction districts. Figure 41 shows a view of one of the machines. A report, covering the work done in connection with the design of the machine, has been completed and will probably be available during 1929.

d. Quality of Concrete:

(1) *Effect of Coarse Aggregate Containing Asphalt on the Quality of Concrete.*—One type of crushed stone coarse aggregate which has been used in State work for several years contains small spots of asphalt throughout the particles. During the early spring and late fall months it is sometimes necessary to heat the aggregate used in construction work, and when this type of aggregate is heated the asphalt particles melt and partially coat the surface of the particle. The question arose as to whether the presence of this asphalt affected the quality of the concrete. An investigation was undertaken and a comparison made of the strength of the concrete using both heated and cold coarse aggregate.

(2) *Compilation of Transverse Beam Test Data.*—When the transverse beam testing machines were placed in operation in the various districts, it was required that each district submit to the Bureau of Materials copies of the results of beam tests. These tests have been correlated and information is being compiled to show the results obtained from the tests. During the year approximately 1,900 tests were made. Most of the specimens represented concrete being used in pavement work, although a few tests were made on bridge concrete. Results were received from eight of the nine construction districts, as well as tests from 15d sections in Cook, Sangamon, Vermilion and Douglas Counties.

(3) *Quality of Concrete as Shown by Pavement Cores.*—During 1928, 6,400 road cores taken during 1927 were tested. Each core was treated as an individual specimen and the compressive strength, absorption and weight per cubic foot were obtained. Approximately half of the cores tested were broken in compression, the remaining half being placed in storage so that specimens from each job are available in case any question should arise in the future relative to the quality of the concrete. There are four Calyx core drills operating in different parts of the State. These drills take from 8 to 10 cores per mile of pavement, and on some sections more than this number are taken. During 1928 approximately 8,400 cores were drilled and these cores will be tested during the year 1929.

(4) *Quality of Concrete as Shown by Test Cylinders from Concrete Bridges.*—As mentioned in paragraph 4 of the Report of the Bureau of Construction, a study was started for the purpose of gathering data as to the strength of the concrete being obtained in our bridge work. The test cylinders taken from these various bridge jobs are forwarded to the Bureau of Materials where they are tested for compressive strength, absorption, and weight per cubic foot. The east approach of the Illinois River bridge at Florence, Illinois, consists of a concrete pile trestle. These piles were cast on the job and were driven as soon as they had obtained the necessary strength. In order to determine this strength, test cylinders were cast from each pile and sent to the Bureau of Mate-

rials for testing. Slump tests were made from the concrete used in casting each test cylinder. If the results of the tests were satisfactory, the contractor was permitted to drive the piling. There were 167 concrete piles driven and 518 cylinders tested. A report covering the results of these tests has been formulated and will probably be available during 1929.

e. Highway Construction:

(1) *Use of Steel Fabric in Constructing Bridge Floors.*—An investigation was undertaken to determine the feasibility of using a special welded wire mesh covered with fine wire screen to replace ordinary wood forms in constructing concrete bridge floors and similar structures. Parallel tests were conducted using both the wire mesh and wooden forms. The quality of the concrete obtained was determined by casting 6″x12″ cylinders and testing them at the age of 21 days, and also from drilling cores from the test slab and testing them at the same age. Briquettes were made of mortar sieved out of the concrete and the tensile strength determined at the ages of 7 and 21 days. Briquettes were also made from the mortar which dripped through the wire mesh and the tensile strength of these briquettes was determined at the ages of 7 and 21 days. In order to determine what effect the amount of water used had on the quantity and quality of the material passing through the wire mesh, slumps of 4″, 5″, 6″ and 8″ were used. A report of this investigation will be available.

(2) *Settlement of Highway Fills.*—During the summer of 1928 further studies were made of the settlement of highway embankments by the water-soaking method. The specifications covering this work were revised to conform to the improved methods which have been developed. During the winter of 1928, elevations were taken on 4.44 miles of pavement constructed over embankments which were water-soaked during the summer of 1926. The soil in these embankments varied from silts and clays to loams and tills containing considerable quantities of rock and gravel. The elevations showed an appreciable settlement at one point only and this was caused by a sliding movement of an embankment because of a drainage condition. This survey also showed that the pavement on these water-soaked embankments contained no more cracks than the pavement on the adjacent sections laid in cut sections; that blacktopping had not been necessary on sections constructed over water-soaked embankments; and that the pavement over these water-soaked embankments showed less settlement and upward movement due to frost than the pavement over the embankments which had not been water-soaked. The cost of water-soaking has also been shown to be considerably less than the cost of maintaining pavements which have been damaged by the settlement of embankments not water-soaked previous to the construction of the pavement surface. Figure 42 shows water-soaking operations under way on a fill on Route 24, east of Springfield.

(3) *Segregation of Concrete Materials Due to Mixing.*—During the progress of the work on Route 108, Sections 101, 102 and 103, a preliminary investigation was undertaken to determine the amount of segregation of materials in the concrete mixer. From the results of this investigation, there is evidence that a general segregation of the mate-

rials in the mixed concrete occurs and that it is much greater and more serious, as far as uniformity of strength is concerned, than the effect of segregation of the aggregates prior to their introduction into the mixer. Entire 5-bag batches of concrete were studied. Moisture determinations of the aggregates were made prior to their introduction into the mixer, and all materials, including the water, were weighed. The coarse aggregate was separated into three sizes, recombined, and proportioned by weight, making as nearly an ideal proportion as it was possible to obtain. After being mixed, the batch was deposited in a nest of beam forms resting upon the subgrade. Five 100-lb. samples of the mixed concrete were then taken from different locations in the batch and these were washed and sieved to determine the relative proportions of the various sizes of coarse aggregate in the mixed concrete. Transverse beam tests were also made to determine the strength of the concrete. The results of this investigation emphasize the non-uniformity in the concrete mixture as it came from the mixer drum and indicate that this problem deserves considerable further study.

6. PREPARATION OF REPORTS AND BULLETINS. —Reports of all research and investigations carried on by the Bureau of Materials were prepared, and a technical bulletin entitled "Directions for Making and Testing Concrete Beams" was issued during 1928 for the use of the Bureaus and the Districts. A complete survey of the commercial plants producing concrete aggregate for highway construction in Illinois was also made and the data are now being compiled into bulletin form for the use of engineers, contractors and others interested.

7. SPECIFICATIONS.—The standard specifications for road and bridge construction have been revised to conform to the latest developments in engineering practice and are now being arranged in a convenient form for the final approval of the administrative officers of the Department. A number of specifications for special materials used by the Bureau of Maintenance were also prepared.

8. DEPARTMENTAL SERVICE.—The following departmental services were rendered by this Bureau:

a. Photographic.—The photographic section secured records of road and bridge construction, and made reproductions of maps, reports, and other data for the Bureaus and Districts where the use of photographs was considered advisable. Many of these records have been used in legal cases where exact duplicates of the original are necessary. An index of all the films on file and sample books containing pictures of construction scenes from the various districts have been prepared to facilitate ordering prints. Table XXV shows the number of films, prints and slides prepared for the various Bureaus.

b. Mechanical Service.—Some of the services rendered by this section were:

(1) The calibrating and repairing of portable scales used by the highway patrol officers.

(2) The construction and repairing of highway exhibits which were sent to the various county fairs.

(3) The construction of mechanical apparatus used in the highway research and investigations.

(4) The construction and repair of various other kinds of equipment.

c. Paint for Construction and Maintenance.—This Bureau inspects, stores and distributes all of the paint used in the construction and maintenance of highways and bridges in Illinois. Table XXIII shows the quantity of paint distributed during the calendar year 1928.

V. BUREAU OF MAINTENANCE.

1. DUTIES.—The Bureau of Maintenance supervises the maintenance of all surfaced roads, detours, unpaved and temporary routes and large bridges; constructs such additions and betterments as are found necessary after the original construction work has been completed; keeps the main trunk highways free from snow; places route markers and safety signs for the convenience and safety of the traveling public; handles the issuing of permits and franchises; maintains a highway police organization to enforce the provisions of the Motor Vehicle Act and the Road and Bridge Laws; keeps a record of accidents occurring on the highways; and publishes route bulletins giving information pertaining to all routes in Illinois. Detailed reports of these activities for 1928 will be found in the following paragraphs.

2. MAINTENANCE OF SURFACED ROADS.—*a. Activities During 1928.*—During the calendar year 1928, the Bureau of Maintenance maintained 6,661.14 miles of surfaced roads, the mileage of the various types being as shown in Figure 43 and the following tabulation:

Type.	Miles.	Per Cent.
Portland Cement Concrete	6,203.27	93.13
Bituminous Concrete	42.55	.64
Brick	178.44	2.68
Bituminous Macdadam	25.85	.39
Water Bound Macadam	45.82	.68
Gravel	165.11	2.48
Total	6,661.14	100.00

b. Maintenance Organization.—The maintenance of surfaced roads is carried on in the following manner: The roads, arranged by types as shown above, are divided into patrols; the patrols are grouped as maintenance sections averaging about twenty miles in length, one patrolman being assigned to each section; a number of maintenance sections, usually about six or eight in number, are under the supervision of a supervising patrolman who is responsible to the District Maintenance Engineer who is in general charge of all maintenance work carried on in the district; the District Maintenance Engineer is responsible to the District Engineer who in turn reports to the Engineer of Maintenance. The employment of laborers to assist maintenance patrolman in the performance of their duties must be approved by the supervisor and where an unusual amount of help is required, the approval of the District Engineer must be secured. The division of the various types of surfaced roads into patrols is shown in Table XXIV.

c. Maintenance Equipment.—Each patrolman is equipped with a truck, tar kettle, a road grader and drags, and such other small tools as may be necessary for the repairing or replacement of damaged surfaces. He is held responsible for the keeping of his equipment in serviceable condition and is required to report the condition of same periodically to his supervising patrolman. Other equipment, such as concrete mixers, tractors, traffic line machines, mowing machines, snow plows, etc., are also available for general use in each district.

d. Maintenance Methods.—The maintenance of surfaced roads includes the repair or replacement of damaged portions of the wearing surface; filling ruts and eroded places in the earth shoulders; cleaning culverts and ditches; cutting weeds and vegetation growing on the right-of-way; cleaning and clearing the right-of-way; repairing and replacing route markers and safety signs; painting traffic line; repairing, repainting, and replacing guard fence; repairing, cleaning and repainting bridges; and the removal of snow.

Where narrow cracks and breaks have developed in concrete pavements, they are generally repaired with asphalt, sand and gravel. Large cracks are repaired with concrete. Depressions or surface settlements are built up with asphalt, gravel, stone or chips, or the damaged section is replaced with new construction. Ruts in the shoulders are filled with earth and dragged smooth. In the case of some of the heavier traveled roads where excessive ruts have developed, gravel, shale or crushed stone is placed along the edge of the pavement. Ditches and culverts are cleaned systematically to provide the necessary drainage. Weeds are cut and the shoulders mowed during the summer and fall season.

e. Patrol Marking System.—A patrol marking system has been perfected whereby the first figure of the patrol number indicates the district in which the patrol is located, the second figure indicates the type of road, and the remaining figures indicate the number of the patrol of that type in that district; the patrols being so arranged according to number that the oldest pavement is numbered first with the various years of construction of such types following each other in numerical sequence. This system of marking patrols enables the Bureau to collect cost data not only according to districts but also by road types and period of construction.

f. Maintenance Costs.—(1) *For Total Mileage of Surfaced Roads Maintained.*—Cost data for the various items of work necessary for the maintenance of the various types of surfaced roads during 1928 are shown in Table XXVI. These data are reduced to a per mile basis in Table XXVII. Figure 44 shows the division of the cost of maintenance on the total mileage of surfaced roads for 1928 and Figure 45 shows the division of this cost by cost components.

(2) *Portland Cement Concrete Roads.*—The cost data for the portland cement concrete roads given in Table XXVI is shown in Figure 46, and the division of the cost of maintenance for this type of road is given by cost components in Table XXVIII.

(3) *Brick Roads.*—The cost data for brick roads given in Table XXVI is shown in Figure 47 and the division of the cost of maintenance for this type of road is given by cost components in Table XXIX.

(4) *Bituminous Concrete Roads.*—The cost data for bituminous concrete roads is given in Table XXVI and the cost of maintenance for this type of road is given by cost components in Table XXX.

(5) *Bituminous Macadam Roads.*—The cost data for bituminous macadam roads is given in Table XXVI and the division of costs of maintenance for this type of road is given by cost components in Table XXXI.

(6) *Water-bound Macadam Roads.*—The cost data for water-bound macadam roads is given in Table XXVI and the division of costs of maintenance for this type of road is given by cost components in Table XXXII.

(7) *Gravel Roads.*—The cost data for gravel roads is given in Table XXVI and the division of the cost of maintenance for this type of road is given by cost components in Table XXXIII.

3. MAINTENANCE OF DETOURS, UNPAVED AND TEMPORARY ROUTES.—*a. Activities During 1928.*—The Bureau of Maintenance maintained 240.21 miles of detours, unpaved and temporary routes during the calendar year 1928, the mileage of the various types being as shown in Figure 48 and the following tabulation:

Type.	Miles.	Per Cent.
Earth	110.33	45.93
Gravel	114.46	47.65
Cinders	8.94	3.72
Macadam	4.52	1.88
Shale	1.25	.52
Miscellaneous	.71	.30
Total	240.21	100.00

b. Maintenance Organization.—Detours, unpaved and temporary routes are divided into patrols which are maintained by patrolmen employed on an hourly or monthly basis depending upon the amount and kind of work required and the traffic conditions encountered. The division of the various types into patrols is shown in Table XXXIV.

c. Maintenance Equipment.—Each patrolman employed for this type of work is required to furnish a team. A light road grader, drags and other necessary equipment are furnished by the Bureau.

d. Maintenance Methods.—The maintenance consists of the surfacing and grading of the wearing surface; cleaning culverts and ditches; cutting weeds and vegetation growing on the right-of-way; and the placing and maintaining of route markers and safety signs. Gaps in pavement which were omitted due to excessive fills or other causes are surfaced with gravel or macadam. All detours and temporary routes are marked at convenient points for the convenience and safety of the traveling public.

e. Maintenance Costs.—Only such funds are expended for the maintenance of detours, unpaved and temporary routes as is necessary to care for the traffic in a satisfactory manner. As soon as the construction work is completed, which these roads are serving, the pavement is thrown open to traffic and these roads abandoned. The maintenance cost data for these roads, by division of work, are shown in Figure 49 and Table XXXV. This data is reduced to a cost per mile basis in Table XXXVI. The maintenance cost data is given by cost components in Figure 50 and Table XXXVII.

4. MAINTENANCE OF LARGE BRIDGES.—Separate patrols have been created for all bridges one hundred feet or more in length. Table XXXVIII shows the number of such bridges located in the various districts, the cost of maintenance and upkeep of same and the average cost per bridge per district for the calendar year 1928.

5. CONSTRUCTION OF ADDITIONS AND BETTERMENTS. —After the original construction work has been completed it is often necessary to add certain additions and betterments not covered in the original contracts, such as: New baffle walls, retaining walls, additional culverts, curb and gutter, etc. Before this work can be done, however, the District Engineer must submit a request to the Maintenance Engineer for an authorization for the contemplated work. This request must show the location and description of the work, together with an estimate of the cost. During the calendar year 1928, 1,045 authorizations were issued by the Bureau of Maintenance for the construction of additions and betterments costing $260,746.66. Table XXXIX shows the division of this work by highway districts and the items constructed. Owing to the fact that these additions and betterments are considered as permanent improvements, payment for same is made from the construction funds and a separate cost record is kept for this work.

6. SNOW REMOVAL.—The constantly increasing mileage of hard-surfaced roads increases the possibility of snow removal work, but unless the snowfalls are general throughout the State this type of work can be readily handled by the system which has been developed by the Bureau of Maintenance. This consists of the assignment of heavy trucks and snow plows to definite sections. In the case of heavy falls in certain areas, the equipment from nearby sections having no snowfall are sent to the snowfall area to assist the local crews. In the case of general snowfalls, extra trucks and plows are hired from private owners.

The snowfall for 1928 was the lightest for the past ten years, according to the records of the Bureau. There were four falls from January 1st to April 1st and one in December but they were all local in character. The worst blockades were caused by the fall of December 30-31, 1927, which drifted badly on January 1, 1928. This fall centered along a line from Canton to Kankakee and the high winds piled up drifts five and six feet deep on some of the routes. All roads were opened, however, within twenty-four hours.

Figure 51 shows the distribution of the snowfall for 1928 and the cost of snow removal for that year is shown in Table XL. Figure 52 shows a portion of a 1,500-foot snow drift on Route 78, Section 104, one mile south of Warren, JoDaviess County, which was opened with a rotary snow plow in December, 1928. Figure 53 shows the rotary snow plow working in the drift shown in Figure 52.

7. ROUTE MARKERS AND SAFETY SIGNS.—The type of route marker and safety sign which is being used in Illinois complies with the regulations adopted by the United States Bureau of Public Roads and the American Association of State Highway Officials for the uniform marking of the principal highways of the United States. The

cost of route and safety marking for 1928 is shown by cost components in Table XLI.

a. Route Markers.—All routes on the State-wide system of hard-surfaced roads as well as the detours, unpaved and temporary routes are marked by the Bureau of Maintenance for the convenience of the traveling public and in the following manner: The number of the State route, placed within an outline map of the State of Illinois, is placed on roadside markers (Figure 54) and on telephone poles (Figure 55) at frequent intervals along the routes. At the junction of State routes, markers are erected which show the number of the intersecting routes (Figure 56) and the principal towns and mileages along the routes (Figure 57). Markers erected at the city limits of each town, show the name of the city or town and its population (Figure 58) and the names of the principal cities and towns along the route and the mileage thereto (Figure 59). Routes through cities have been marked at convenient points inside the city limits (Figure 60) and direction signs have been erected which show the direction and distance of prominent towns along the intersecting routes (Figure 61).

b. Safety Signs.—Warning or safety signs have also been erected on all State routes and detours. These signs have been placed at sufficient distance from the point of danger to enable drivers to check their speed before reaching the indicated point. The shape of these signs indicate the degree of care to be exercised by the driver. The square or rectangular sign indicating a minimum degree of danger, the diamond shaped sign indicating caution or an intermediate degree of danger, and the octagonal sign indicating danger of a maximum degree. Examples of these signs are shown in Figures 62 to 67, inclusive.

All approaches to railroad grade crossings are marked by a round sign with black cross bars and by diagonal black and white stripes painted on pavement at intervals of one hundred feet, the first being at a distance of four hundred feet from the nearest rail. Figure 68 shows these two types of warning markers.

In addition to these signs, an asphalt traffic line is applied down the center of all hard-surfaced roads for the purpose of guiding traffic and protecting the center construction joint. The asphalt is applied by a machine which has been developed and constructed by the Bureau of Maintenance. An average day's work for one of these machines is approximately twenty miles.

c. Government Markings.—A committee composed of members of the United States Bureau of Public Roads and American Association of State Highway Officials worked out a system known as Federal highways. These Federal routes through the State of Illinois have been marked with a shield bearing the State name and the United States route numbers. This shield is white with black figures, letters and border. The type of Government shield used in cities is shown in Figure 60 and the shield adopted for general use is shown in Figure 54. Figure 69 shows the location and number of the various Federal routes in Illinois.

8. RIGHT-OF-WAY POSTS.—The Department adopted the policy of setting concrete right-of-way marker posts at the right-of-way

line on all completed State routes to prevent the encroachment of property owners on State right-of-way. The posts are made at the Chester Penitentiary, the State paying for the material. Approximately 20,850 posts were made in 1928.

9. EQUIPMENT.—Heavy equipment used in the maintenance of the 6,661.14 miles of surfaced roads and the 240.21 miles of detours, unpaved and temporary routes during the calendar year 1928, includes the following listed machinery in addition to numerous tools and miscellaneous supplies such as shovels, axes, jacks, rope, crow bars, hammers, saws, etc.:

Item.	Number.	Item.	Number.
Heavy Trucks	299	Caterpillar Tractors	35
Light Trucks	425	Fordson Tractors	17
Passenger Cars	56	Truck Cranes	2
Road Graders	315	Slip Scrapers	208
Asphalt Heating Kettles	235	Wheelbarrows	183
Concrete Mixers	26	Wheel Scrapers	42
Road Drags	297	Traffic Line Machines	10
Air Compressors	6	Mowing Machines	78
Snow Plows	314		

10. PERMITS AND FRANCHISES.—All property owners, corporation, public utilities or other individuals or corporations desiring to perform work of any nature within the limits of the right-of-way are required by law to obtain a permit from the Division of Highways before such work can be done. These permits enable the Division of Highways to control the placing of such items within the highway right-of-way and prevent the encroachment of private interests or corporations on State property, thereby preserving the highways for highway purposes.

The Bureau of Maintenance prepares the forms showing the location and nature of the work covered in the requests received for permits investigates the necessity of the work proposed, causes the legal aspects to be investigated and then submits the permits to the Chief Highway Engineer for his approval.

During the year 1928, 2,609 permits were issued covering the construction of entrances to private properties, gasoline filling stations, lunch-stands, telephone and telegraph lines, electric power transmission lines, water mains, cable conduits and sewers.

11. HIGHWAY POLICE.—*a. Organization and Duties.*—The Bureau of Maintenance has supervision of the highway police organization consisting of a chief, thirteen sergeants, one hundred forty-two officers and six mechanics. It is the duty of this organization to enforce the provisions of the Motor Vehicle Law, the Road and Bridge Laws, and to furnish information relating to the legal use of the highways to the traveling public.

b. Equipment.—Each sergeant is equipped with a car and the patrol officers are furnished a motorcycle and side car and a set of portable scales for weighing trucks. The uniforms worn by the members of the organization are also supplied by the Division of Highways.

c. Cost and the Work Accomplished.—The work accomplished by the highway police during the calendar year 1928 is shown in Table XLII. Figure 70 shows the division of costs for this organization for 1928.

12. ACCIDENT REPORTS.—A new system of reporting accidents occurring on the State highways, based upon the system recommended by the National Safety Council and now used in several other states, was put into effect in August, 1928. By this system, maintenance employees and highway patrol officers forward to the Springfield office reports showing the cause and location of accidents and injuries, deaths and damages resulting from them. The location of accidents is shown on a map, tabulations are prepared each month, and summarized at the end of the year. These data are studied with the view of preventing similar accidents by eliminating as many of the causes as possible. The following tabulation shows a summary of the reports received under the old and new systems in 1928:

*Number of Accidents Reported	565
Persons Killed	205
Persons Injured	668

PRINCIPAL CAUSES OF THE ACCIDENTS.

Mechanical Defects of Vehicle	15
Blinded by Lights, Snow or Fog	25
Carelessness	71
Reckless Driving	75
Collisions	48
Pedestrians Struck	18
Failure to Stop at Stop Sign	17
Intoxicated Driver	29
Lost Control of Car	56
No Lights on Car	11
Parking on Pavement	20
Skidded	49
Speeding	42
Sleeping Driver	9
Unknown Causes	56
Miscellaneous	24

13. ROUTE BULLETINS.—During 1928 the Bureau of Maintenance continued the publication of a route bulletin giving information pertaining to all routes. This information consists of a detailed description of each route, distances between towns and cities on the various routes, kinds and condition of the pavement or road surfaces, and in a general way indicates the population of the towns and the location of tourist camps. It was revised three times during the year, in order to keep the information up to date, and copies were furnished free to automobile clubs, hotels, filling stations, garages and other places where it would be available to the traveling public.

14. COST ACCOUNTING.—The cost data embodied in this report was made possible by the system of accounting now used by the Bureau of Maintenance. This system permits the very complete analysis of the cost of the various classes of work by types, year of construction and by the districts in which the work was carried on. This system also enabled the Bureau to keep complete cost records on the large additional mileage of roads taken over for maintenance during 1928 with no increase in the accounting force.

During 1928 the Bureau of Maintenance issued 31,935 vouchers involving a total expenditure of $2,771,710.63 from the maintenance fund. A complete trial balance covering the transactions of the Bureau for the calendar year 1928 is shown in Table XLIII. The debits shown in this trial balance are shown by division of activities in Figure 71. The credits are shown according to their source in Figure 72.

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* Percentage of the total number of accidents which this figure represents is not known. It is difficult to obtain a report on all of them.

VI. BUREAU OF AUDITS.

1. DUTIES.—The duties of the Bureau of Audits include the following activities: the accounting and auditing of all road and bridge revenues and expenditures accruing to or expended by the Division of Highways; the preparation of financial statements and estimates, and statistics relating to the finances, equipment and other activities of the Division; the checking of all permits, franchises, contracts, agreements, leases, rentals, bonds, payment estimates, payrolls, expense accounts and requisitions for equipment and supplies; the recording and filing of all claims, liens and assignments against contractors; the accounting for cement furnished by the State to the various road contracts; the distribution of supplies, equipment, letting notices, bulletins, pamphlets, highway maps, etc.; the handling of the blueprinting, mimeographing and addressograph work and the central and storage files of the Division of Highways.

The work of the Bureau is handled through the following sections: Administrative, accounting, blueprinting and supply, and the central and storage files. The accounting section consists of the following sub-sections: Construction disbursement, maintenance disbursement, general books and accounts, and cost and statistics. The Bureau is administered by the Chief Clerk, assisted by the Assistant Chief Clerk, who acts as Chief Accountant, and by the heads of the various sections of the organization.

2. ADMINISTRATIVE SECTION.—The activities of the administrative section are under the immediate control of the Chief Clerk and consist of the general and administrative work of the Bureau such as are described below.

All requests for permits or franchises for the use of the State highways for the construction of entrances to private properties, gasoline filling stations, lunch stands and to companies and corporations for the privilege of placing and maintaining telephone and telegraph lines, electric power transmission lines, water mains, cables, conduits, sewers and bus lines are carefully investigated in this Bureau as to their legal aspects before being finally approved by the Chief Highway Engineer. During 1928, 2,608 permits of this nature were handled.

All contracts, leases and agreements are also prepared in or submitted to this Bureau for approval before being approved by the Chief Highway Engineer.

All liens, claims and assignments filed against contractors covering labor, material or equipment furnished by outside parties are received, recorded and filed in this office. A detailed record of such claims against each contractor for each section of work under contract is kept on file and arrangements are made for taking care of such claims or assignments before settlement is made with the contractors.

3. ACCOUNTING SECTION. The construction disbursement division of the accounting section deals with the payment of bills, payrolls, expense accounts, engineer's payment estimates; the reporting and handling of appropriations and fund accounts; the classification of ex-

penditures; and provides control accounts over construction costs and statistics.

The maintenance disbursement division deals with the payment of bills, payrolls, expense accounts; the reporting and handling of appropriations and fund accounts; the classification of expenditures, and provides control accounts over maintenance costs and statistics.

The general books and accounts division, furnishes the summarization of the receipts and disbursements of the Division of Highways according to funds, appropriations, functions and organization units carrying on the work. They also furnish a means of financial control whereby it is possible to measure obligations against funds and by means of the double entry system insures the accuracy of the subsidiary records.

The cost and statistics division deals with the collection and dissemination of costs of work built under the jurisdiction of the various units of the Division of Highways, whereby it is possible to obtain a comparison of the results accomplished against moneys expended. Owing to the great demand for statistical and cost information, not only on the part of the State administration and the public of Illinois, generally, but also from other states, corporations and individuals, it is highly important to maintain and have such statistical and cost information as may be requested. The information collected by this division is also of great value to the Chief Highway Engineer in enabling him to manage the fiscal and financial affairs of the Division of Highways.

The increased volume of work carried on by the Division of Highways during 1928 brought about a corresponding increase in the activities of the accounting section of the Bureau, which in addition to accounting and auditing all road and bridge revenues accruing to the Division, handled total expenditures from all appropriations and funds, amounting to $47,322,565.51 covered by 62,733 vouchers.

The system of accounting used in 1928 enabled the Bureau to handle the work without any increase in personnel and furnish the statements and statistics relating to finances, equipment and the other activities of the Division of Highways which are incorporated in this report. Financial estimates and statements were also prepared from time to time for the Chief Highway Engineer.

The greater part of the records and books of accounts of the Division of Highways are now on a double entry and cost basis and the remainder is being installed as rapidly as possible. This system enables the Bureau to readily determine the relative efficiency and economy of operating the various units of the Division. An internal budgetary control system is being designed and will be put into effect so as to become operative not later than July 1, 1929.

The accounting classification (Figure 74) under which the records of the Division are maintained, conforms to the classification established by the committee on uniform accounting of the American Association of State Highway Officials.

During 1928, a total of 4,200,000 barrels of cement were contracted for by the Division of Highways, of which 3,789,250 barrels were shipped to the various construction sites throughout the State. The construction disbursement section handles the payment for this cement and maintains a complete record and follow up system covering the disposition of this material.

4. BLUEPRINTING AND SUPPLY SECTION.—The blueprinting and supply section of the Bureau was especialy active during the calendar year 1928 when peak demands were made upon it by the various bureaus and district offices of the Division of Highways. The summary reports of the various activities enumerated below will give some idea of the savings in time and money brought about by this section.

a. Blueprinting.—During 1928, approximately 85,500 yards of 36 inch blueprint paper, or enough to cover 17.7 acres, were used in making the plan work required by the contracts awarded for 1,459.41 miles of pavement, 385.28 miles of grading and 424 bridges, and for the 14,708 bridge and culvert plans prepared by the bridge section of the Bureau of Design. The blueprint paper was purchased in quantity lots and the increased work was handled without any increase in personnel.

b. Mimeographing.—The use of the mimeograph reduces the printing and typewriting expense of the Division and the amount saved by this Division during 1928 may be judged by the fact that approximately 700,000 sheets of mimeograph paper were used for letting notices, reports, forms, etc.

c. Addressographing.—All letting notices, bulletins, pamphlets, and other literature published by the Division are proof read, addressed for mailing and distributed by this section. The use of the addressograph facilitates the handling of this work, the volume of which is shown by the fact that 7,289 plates have been made up for this machine. These plates contain the names and addresses of paving, grading and bridge contractors, highway material producers and dealers, etc.

d. Supplies.—All printing, office and engineering supplies and equipment used by the various bureaus and district offices are requested through this Bureau and are received, checked, stored and distributed by the supply section. Bulletins, pamphlets, stationery, forms, etc., are requisitioned through the Division of Printing where they are filled under State contracts. Office and engineering supplies are requisitioned through the Division of Purchases and Supplies. This system of purchasing and checking the supplies results in a considerable saving to the Division of Highways.

5. CENTRAL AND STORAGE FILES SECTION.—All correspondence, records, reports, etc., pertaining to the affairs of the Division of Highways, must be safeguarded and filed in such a manner that they are readily accessible at all times. Fireproof and air-tight sectional files are used for this work and this activity is carried on by or under the direction of the Central and Storage Files Section of the Bureau of Audits. The system used for this work follows:

All correspondence pertaining to particular routes, sections or projects, right-of-way agreements, subways and overheads, and other matters pertaining to the design of pavements or bridges, before they are placed in line of construction, are filed alphabetically and chronologically and by route, section or project under the design section of the active files. When the contracts are awarded for a section or project, that file is placed in the active construction section where it remains until the construction work is completed and the final estimate is issued. Upon issuance of final estimates, the material is placed in the storage section.

A general file is used for all correspondence, etc., not directly related to any particular route, section or project, such as the executive correspondence with the Governor, Attorney General and other State officials; specifications; bonds; and material concerning design, surveys, construction methods, materials, supplies and equipment; maps; highway machinery; circular letters outlining the policies of the department; correspondence regarding cement contracts; correspondence with other State highway departments; resolutions from the various counties; etc.

All correspondence, records, etc., from the various officers of the Division are transferred to the central storage files as soon as they are considered inactive. The material is filed in these files by route, section or project, or in a miscellaneous or general section.

A fair idea of the volume of work done by this section may be gained by a consideration of the extensive construction programs which have been carried on by the Division of Highways in recent years.

6. STATEMENTS, CHARTS AND STATISTICS.—The statements, graphic charts and statistics enumerated below, relate to the financial work of this Bureau and show the road and bridge revenues and appropriations, the expenditures which have been made and the balances on December 31, 1928. They also show the statistics relating to the retirement of both the $60,000,000 and $100,000,00 bond issues.

a. Combined Revenues, Expenditures and Balances.—The division of revenues by funds, 1911 to 1928, inclusive (Figure 73). The division of the combined expenditures from the road fund, $60,000,000 Bond Issue Fund and $100,000,000 Bond Issue Fund, 1914 to 1928, inclusive (Figure 75). The combined expenditures from the road fund, $60,000,000 and $100,000,000 Bond Issue Funds and General Revenue Fund appropriations, from 1913 to 1928, inclusive (Table XLIV). The balances, receipts and expenditures for all funds combined for the calendar year 1928 (Table XLV).

b. Combined Bond Tables and Statistics.—The amount of principal and interest payable each year on all series of the $60,000,000 Bond Issue and on $77,000,000 of the $100,000,000 Bond Issue sold to December 31, 1928 (Table XLVI and Figure 77). The amount of principal due at each retirement period on the entire $60,000,000 Bond Issue plus $77,000,000 of the $100,000,000 Bond Issue sold to December 31, 1928 (Table XLVII). The amount of interest due at each interest paying period on the entire $60,000,000 Bond Issue plus $77,000,000 of the $100,000,000 Bond Issue sold to December 31, 1928 (Table XLVIII).

c. Road Fund Statistics.—The road fund is made up of Federal aid funds received from the U. S. Government, motor license fee receipts and miscellaneous collections such as the accrued interest on bonds sold and the collections of the Division of Highways. This fund is used for the retirement of the principal and payment of interest on outstanding highway bonds of both the $60,000,000 and $100,000,000 Bond Issues, for the payment for maintenance work on the $60,000,000 and $100,000,-

000 Bond Issue Systems and for maintaining such State aid roads as the State is responsible for, and for the payment of special appropriations which are made by the General Assembly from these revenues. The surplus remaining in the road fund is used for new construction work on the State Bond Issue Systems.

(1) Road Fund Revenues and Sources from Which They Were Collected.

(a) *Federal Aid Allotments.*—A statement of the Federal Aid Funds allotted by the U. S. Government for highway work in Illinois for the fiscal years 1917 to 1930, inclusive (Table XLIX).

(b) *Motor License Fees.*—A statement showing the motor license fees collected by the Secretary of State and the number of vehicles from which such collections were made during the calendar years 1911 to 1928, inclusive (Table L). The motor license fees collected each month during the calendar years 1925, 1926, 1927 and 1928 (Table LI). The motor license fees collected in each county during the calendar years 1925, 1926, 1927 and 1928 (Table LII).

(c) *Miscellaneous Collections.*—All moneys or funds accruing to any Bureau of the Division are forwarded to this Bureau where a register is kept of same and deposits are prepared and forwarded to the State Treasurer. These records are audited semi-annually by the State Auditor of Public Accounts. The collections of the Division of Highways and the sources from which collected during the calendar year 1928 (Table LIII).

(2) *Road Funds Deposited in State Treasury.*—The road fund revenue (exclusive of gas tax receipts) deposited in the State treasury each month during the calendar year 1928 (Table LIV). The road fund revenue deposited in the State treasury each year from 1911 to 1928, inclusive (Table LV and Figure 76).

(3) *Road Fund Appropriations.*—The appropriations payable from the road fund from 1913 to 1927, inclusive (Table LVI).

(4) *Road Fund Expenditures.*—The various expenditures from the road fund from 1914 to 1928, inclusive (Table LVII and Figure 78).

(5) *Road Fund Receipts, Expenditures and Balances.*—The road fund receipts, expenditures and balances (exclusive of gas tax) for each month during 1928 (Table LVIII).

(d) *Sixty Million Dollar Bond Issue Statistics.*—The $60,000,000 Bond Fund was derived from the sale of the $60,000,000 Bond Issue and has been used entirely for construction on the system of durable hard-surfaced roads provided for in the provisions of the $60,000,000 Bond Issue Act of 1918.

(1) *Retirement and Interest Calculations.*—The arrangement of the retirement of the principal and payment of the interest on all series of the $60,000,000 Bond Issue which was voted November 4, 1918 (Tables LIX to LXVIII, inclusive).

(2) *Bond Fund Revenue Deposited in State Treasury.*—The Bond Fund revenue derived from the sale of the $60,000,000 Bond Issue, deposited in the State Treasury (Table LXIX). The proceeds of sales of the $60,000,000 Bond Issue together with the amounts sold, arranged by years from 1921 to 1924, inclusive (Figure 79).

(3) *Appropriations.*—The appropriations made by the General Assembly from the $60,000,000 Bond Issue Fund (Table LXX).

(4) *Expenditures.*—The division of the expenditures which have been made from the fund derived from the sale of the $60,000,000 Bond Issue, for the calendar years 1921 to 1924, inclusive (Table LXXI and Figure 80).

(e) *One Hundred Million Dollar Bond Issue Statistics.*—The $100,000,000 Bond Issue Fund is derived from the proceeds of the sale of the $100,000,000 Bond Issue and is used entirely for construction on the State-Wide System of durable hard-surfaced roads provided for in the provisions of the $60,000,000 Bond Issue Act and the $100,000,000 Bond Issue Act which was voted November 4, 1924.

(1) *Retirement and Interest Calculations.*—The arrangement of the retirement of the principal and payment of the interest on all series of $77,000,000 of the $100,000,000 Bond Issue sold to December 31, 1928 (Tables LXXII to LXXXII, inclusive).

(2) *Bond Fund Revenue Deposited in State Treasury.*—The Bond Fund revenue derived from the sale of $77,000,000 of the $100,000,000 Bond Issue sold to December 31, 1928, deposited in the State Treasury (Table LXXXIII and Figure 81).

(3) *Appropriations.*—The appropriations made by the General Assembly from the $100,000,000 Bond Issue Fund to December 31, 1928 (Table LXXXIV).

(4) *Expenditures.*—The division of the expenditures which have been made from the fund derived from the sale of $77,000,000 of the $100,000,000 Bond Issue, 1925 to 1928, inclusive (Table LXXXV and Figure 82).

(5) *Receipts, Expenditures and Balances.*—The receipts, expenditures and balances by months from the $100,000,000 Bond Issue Fund for the calendar year 1928 (Table LXXXVI).

(f) *General Revenue Fund Statistics.*—The general revenue fund is derived from general tax levies made for State purposes and is used only in such cases where special appropriations are made by the General Assembly for special construction, either on or off of $60,000,000 and $100,000,000 Bond Issue Routes.

(1) *Appropriations.*—The appropriations payable from the general revenue fund as made by the Fifty-fourth and Fifty-fifth General Assemblies (Table LXXXVII).

(2) *Expenditures.*—The expenditures from the Fifty-fifth General Assembly revenue fund appropriations during the calendar year 1928 (Table LXXXVIII).

(3) *Receipts and Expenditures.*—The receipts and expenditures from the general revenue fund on account of special construction payable from such revenue by special appropriations during the calendar year 1928 (Table LXXXIX).

(g) *General and Miscellaneous Statistics.*—

(1) *Cash Discounts on Bills Paid.*—During 1928 cash discounts

totaling $408,437.60 were taken due to prompt payment of bills, itemized as follows:

Discount on Cement	$378,925.00
Discount on Day Labor Construction Bills	2,334.66
Discount on Gasoline Purchases	24,428.03
Discount on Oil Purchases	1,296.91
Discount on Miscellaneous Bills	1,453.00
Total Discounts Taken	$408,437.60

(2) *Refunds to Counties and Municipalities.*—The $60,000,000 and $100,000,000 State Bond Issue Acts provide that certain refunds be made to counties for improved roads utilized and made a part of the State-wide system. Subsequent action by the General Assembly provides that certain refunds be made to municipalities for city pavements constructed to connect bond issue roads built to the corporate limits. The status of these refunds will be found in the report of the Road Section of the Bureau of Design. A list of the tables showing the appropriations for these refunds and the amounts refunded follows:

(a) *Refunds to Counties.*—Statement showing the amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, House Bill 766, 52nd G. A. (Table XC). Statement showing the amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, House Bill 867, 52nd G. A. (Table XCI). Statement showing the amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, House Bill 822, 53rd G. A. (Table XCIII). Statement showing amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, Senate Bill 515, 54th G. A. (Table XCIV). Statement showing amounts refunded to counties for their share of cost of sections incorporated in the State Bond Issue System from appropriation of $3,000,000, Senate Bill 395, 55th G. A. (Table XCV). A combined statement showing the amount refunded to each county under each appropriation bill for the cost of sections incorporated in the State Bond Issue System to December 31, 1928 (Table XCVI).

(b) *Refunds to Municipalities.*—The total refunds to municipalities from July 1, 1927, to December 31, 1928 (Table XCII).

VII. TABLES.

For a ready reference to the text matter for the tables shown in this section, see "Tables" on page VII.

TABLE I—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1918	------	------	------	------	------	8.36	$ 201,619.40	$24,131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401.77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47.57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1,488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5,818.01	83	901,884.69	472.05	12,634,976.84	26,766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23,123,159.60	26,617.20
1924	163.93	2,013,223.70	12,280.99	84	1,070,387.21	503.54	13,597,135.32	27,003.09
1925	143.78	1,330,186.60	9,251.54	135	2,607,739.92	899.20	23,818,244.21	26,488.26
1926	41.25	529,489.19	12,863.10	62	2,357,421.08	378.00	10,243,739.05	27,099.84
1927	143.26	2,010,988.09	14,037.33	184	2,108,958.81	627.18	18,286,152.06	29,156.15
1928	351.46	4,872,155.40	13,862.49	381	5,324,487.17	1,274.09	37,525,361.41	29,452.67
Total	1,703.65	$18,942,066.02	$11,118.51	1,425	$20,351,655.92	6,176.14	$174,642,316.73	$28,276.93

NOTE—Grading and bridge work shown does not necessarily coincide with the pavement shown. No Federal Aid or State Bond Issue Contracts were awarded previous to 1918.

TABLE II—CONTRACTS AWARDED UNDER SECTION 15D.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1916	------	------	------	------	------	174.58	$2,204,680.94	$12,628.49
1917	25.93	$ 60,658.01	$ 2,339.30	16	$ 5,065.00	37.34	745,962.28	19,977.56
1918	11.00	45,609.17	4,146.29	21	44,179.64	10.84	270,480.54	24,952.08
1919	42.58	167,425.56	3,932.02	25	40,680.00	153.94	4,391,177.96	28,525.26
1920	13.07	104,533.72	7,997.98	10	185,494.87	44.06	1,626,373.67	36,912.70
1921	17.57	100,154.52	5,700.31	4	61,746.82	63.84	1,484,506.53	23,253.55
1922	15.23	102,085.56	6,702.92	87	359,743.96	258.34	5,637,805.33	21,823.20
1923	17.46	185,844.97	10,644.04	22	620,366.61	187.41	3,433,764.03	18,322.20
1924	21.38	221,007.97	10,337.14	65	329,099.57	175.29	3,559,634.26	20,307.11
1925	52.36	533,349.06	10,186.19	38	358,394.54	122.48	2,966,340.07	24,218.98
1926	56.24	665,000.82	11,824.34	11	155,400.98	106.56	3,140,570.97	29,472.33
1927	85.52	1,172,020.46	13,704.64	17	394,995.26	141.39	4,398,115.94	31,106.27
1928	33.82	448,820.13	13,270.84	22	524,626.83	145.58	5,192,790.95	35,669.67
Total	392.16	$3,806,509.95	$9,706.52	338	$3,079,794.08	1,621.65	$39,052,203.47	$24,081.77

TABLE III—CONTRACTS AWARDED DURING 1928 UNDER SECTION 15D.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Bond			1	$ 14,929.55			$ 14,929.55
Cook	18.564	$271,152.45	8	387,189.09	70.996	$3,548,843.01	4,207,184.55
Douglas					3.083	59,141.01	59,141.01
Fulton	1.957	18,667.48			2.460	60,599.73	79,267.21
Grundy					1.955	30,957.94	30,957.94
Iroquois			1	5,120.80	24.854	401,821.65	406,942.45
Kane	.752	6,793.50	1	9,450.46	3.145	87,052.35	103,296.31
Lake					1.509	34,508.90	34,508.90
Madison					2.386	62,484.07	62,484.07
McLean					4.531	50,130.04	50,130.04
Menard			1	2,603.60			2,603.60
Peoria	4.288	57,153.40	7	38,848.20	2.384	79,679.87	175,681.47
Piatt					.985	14,333.97	14,333.97
Rock Island			1	18,935.82			18,935.82
Sangamon			1	10,886.31	10.150	259,747.01	270,633.32
St. Clair	8.260	95,053.30	1	36,663.00	14.424	434,483.05	566,199.35
Vermilion					.015	2,828.60	2,828.60
Will					1.072	35,375.50	35,375.50
Williamson					1.631	30,804.25	30,804.25
Total	33.821	$448,820.13	22	$524,626.83	145.580	$5,192,790.95	$6,166,237.91

TABLE IV—CONSTRUCTION THROUGH CITIES, BUILT UNDER HOUSE BILL 433.

City.	Route.	Miles.	Completed cost.
Abingdon	41	1.286	$52,528.83
Anna	2	1.103	34,374.00
Bushnell	9	.757	22,918.96
Champaign	39	.125	4,801.08
Charleston	16	.226	5,289.08
Clinton	2	.968	31,890.62
Danville	10	.058	1,933.93
Flora	25	.306	8,296.54
Freeport	5	.368	10,380.40
Galena	5	.689	32,446.43
Galva	28	1.130	28,681.53
Geneseo	7	.986	23,834.91
Harrisburg	1	.404	15,293.74
Highland	11	.765	20,842.04
Jerseyville	3 and 38	1.519	38,574.33
Lawrenceville	1	1.020	22,953.65
Litchfield	16	.696	19,759.66
Marseilles	7	1.965	56,586.17
Mattoon	25	.125	3,434.88
Mendota	2 and 18	1.004	28,522.97
Metropolis	1	1.056	29,552.20
Mt. Carroll	40	.447	11,505.92
Mt. Olive	16	1.780	50,036.99
Ottawa	23 and 7	1.001	29,135.88
Pana	24	.723	18,869.82
Paxton	9 and 25	1.162	31,826.76
Pontiac	4	.867	24,334.64
Robinson	1	.202	10,370.67
Roodhouse	3	1.313	35,409.93
Shelbyville	16	.434	11,853.30
Staunton	4 and 16	1.549	46,902.87
Sullivan	32	.031	1,267.07
Sycamore	23	.099	3,920.32
Vandalia	11	.953	27,618.71
Virden	4	1.647	46,025.97
West Frankfort	37	.363	13,001.75
Whitehall	3	1.962	53,583.81
Total		31.089	$889,160.68

TABLE V—GRADE SEPARATIONS COMPLETED 1928.

Location.				Railroad.	Type of crossing.	Total estimated cost to railroad and State.
Route.	Section.	County.	Near.			
3	84	Scott	Manchester	C. & A	Under	$ 47,814.00
4	F-1	Madison	Center Grove Park	I. T. Inc	Over	42,440.00
12	1	Lawrence	Lawrenceville	B. & O	Over	63,166.00
13	28-V	St. Clair	Belleville	St. L. & O. R	Over	32,670.00
13	24-S	St. Clair	New Athens	I. C	Under	58,200.00
13	25-S	St. Clair	Lementon	I. C	Under	101,500.00
19	86	Cook	Des Plaines	C. & N. W., Soo Line	Under	69,559.00
24	L, S	Sangamon	Springfield	S. H. & P	Under	14,377.00
25	22-V	Douglas	Tuscola	C. I. & W.; I. C.; C. & E. I	Over	90,000.00
27	4-S	Carroll	Lanard	C. M. & St. P	Under	24,291.00
89	101-V	Lee	Dixon	C. & N. W	Over	29,800.00
Total estimated cost of work						$573,817.00

TABLE VI—FEDERAL AID ALLOTMENTS.

Fiscal year ending June 30.	Fund.	Amount allotted to Illinois.	Sub-total.
1917	$ 75,000,000.00	$ 220,926.23	
1918		441,852.46	
1919		658,323.48	
1920		874,220.26	
1921		1,091,266.98	
			$3,286,589.41
1919	200,000,000.00	$2,185,550.65	
1920		3,278,325.98	
1921		3,273,800.93	
			8,737,677.56
1922	75,000,000.00	$3,246,281.07	3,246,281.07
1923	50,000,000.00	$2,164,187.38	
1923	Reapportionment	28,611.00	
1924	65,000,000.00	2,797,888.59	
1925	75,000,000.00	3,203,867.99	
1926	75,000,000.00	3,191,479.00	
1927	75,000,000.00	3,175,616.00	
1928	75,000,000.00	3,154,429.00	
1929	75,000,000.00	3,135,225.00	
1930	73,125,000.00	3,118,949.00	
			23,970,252.96
Total Federal Aid allotments to Illinois			$39,240,801.00

TABLE VII—GRADE SEPARATION CASES SETTLED 1928.

Location.				Railroad.	Type crossing.	I. C. C. case number.	Petition filed.	Final hearing.	I. C. C. order issued.
Route.	Section.	County.	Near.						
2	29	Marion	Central City	I. C	Under	10743	June 26, 1920	Apr. 17, 1928	Apr. 18, 1928
3	69-S	Monroe	Burksville	M. & O	Under	14384	May 23, 1928	May 23, 1928	Nov. 13, 1928
4	6	Grundy	Gardner	C. & A	Over	13482	Aug. 20, 1923	July 24, 1928	July 31, 1928
6	FV3-JA	Cook	Westchester	C. A. & E	Over	15376	Apr. 8, 1926	Aug. 1, 1928	Aug. 1, 1928
7	8	Bureau	Sheffield	C. R. I. & P	Over	15278	June 24, 1925	Oct. 31, 1928	Oct. 31, 1928
13	28-S	St. Clair	Church	I. C	Under	17551	Aug. 1, 1927	Mar. 30, 1928	Apr. 18, 1928
18	11-V	DuPage	Naperville	E. J. & E	Over	16728	Dec. 31, 1926	Sept. 15, 1927	Jan. 10, 1928
21	5	Lake	Lake Villa	Soo Line	Over	14300	July 18, 1924	Jan. 8, 1925	Feb. 11, 1925
23	31	LaSalle	Leland	C. B. & Q	Under	17458	June 24, 1927	Mar. 8, 1928	Mar. 28, 1928
24	L-S	Sangamon	Springfield	S. H. & P	Under	18265	May 2, 1928	May 24, 1928	June 27, 1928
29	V	Bureau	Bureau	C. R. I. & P	Over	16562	July 24, 1926	Oct. 30, 1928	Oct. 31, 1928
30	8-S	Peoria	Princeville	C. R. I. & P	Under	18705	Oct. 22, 1928	Oct. 30, 1928	Oct. 31, 1928
49	142	Will	Peotone	C. M. & St. P	Under	18302	May 15, 1928	July 17, 1928	July 31, 1928
51	104	Will	Frankfort	C. R. I. & P	Under	18011	Jan. 25, 1928	Oct. 30, 1928	Oct. 31, 1928
63	631	Cook	Barrington	E. J. & E	Over	18443	June 29, 1928	July 24, 1928	Sept. 13, 1928
64	130	DuPage	W. Chicago	C. A. & E	Over	18523	Aug. 1, 1928	Aug. 1, 1928	Aug. 2, 1928
74	101	Stephenson	Orangeville	I. C	Over	17816	Nov. 12, 1927	July 24, 1928	Aug. 23, 1928
78	134	Fulton	Norris	C. B. & Q	Under	18569	Aug. 22, 1928	Aug. 23, 1928	Sept. 26, 1928
88	121	Bureau	Buda	C. R. I. & P	Over	18336	May 25, 1928	Oct. 30, 1928	Oct. 31, 1928
98	108	Fulton	Table Grove	C. B. & Q	Under	18395	June 18, 1928	July 24, 1928	Oct. 9, 1928
113	109-S	Kankakee	Kankakee	N. Y. C.; K. & S	Under	17129	May 7, 1927	May 7, 1928	May 8, 1928
121	105-V	Tazewell	Morton	Penn	Over	18303	May 15, 1928	Oct. 3, 1928	Dec. 12, 1928
160	135	Madison	Carpenter	Wabash	Over	18426	June 25, 1928	July 12, 1928	July 25, 1928
164	119	Tazewell	Mackinaw	I. T. S	Over	18461	July 6, 1928	July 19, 1928	July 31, 1928

TABLE VIII—STATUS OF FEDERAL AID JANUARY 1, 1929.

Project number.	S. B. I. route number.	Length, miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
1-86		1,385.513					$49,525.24	$ 17,753.62	$44,373,092.60	$20,827,945.94	$20,827,945.94
87	3	4.348							141,382.98	65,220.00	65,220.00
88	18	3.477					81,995.50	40,997.75	2,196.00	1,098.00	1,098.00
89	3	11.165							305,278.70	148,619.55	148,619.55
90	3	7.649					4,144.96	2,072.48	214,208.33	107,104.16	107,104.16
91	31	3.303							128,626.37	49,545.00	49,545.00
92	3	14.363							399,249.31	199,624.65	199,624.65
93	3	19.735							557,527.32	276,473.55	276,473.55
94	22	5.076							154,946.34	77,473.17	77,473.17
95	23	19.735							525,628.44	262,814.21	262,814.21
96	13	23.805							670,991.60	328,046.69	328,046.69
97	9	30.212							844,569.98	422,284.98	422,284.98
98	16	12.859							340,999.36	170,499.67	170,499.67
99	9	19.082					64,328.57	30,643.63	473,304.51	235,131.32	235,131.32
100		Withdrawn									
102	24	12.833					159,881.54	64,796.69	265,858.25	132,929.12	132,929.12
103	1	18.804					119,301.71	59,650.85	359,391.91	179,695.95	179,695.95
104	34	38.570					74,528.61	36,387.30	1,158,117.73	540,337.22	540,337.22
105	8	18.381					46,888.90	22,464.59	503,293.38	199,427.33	199,427.33
106	39	21.222					208,620.59	104,310.30	388,122.25	194,061.12	194,061.12
107	30	17.979					78,359.87	38,846.85	468,871.71	232,725.19	232,725.19
108	36	18.030							435,269.81	217,634.90	217,634.90
109	40	39.133					49,067.21	24,533.61	1,081,562.13	538,028.75	538,028.75
110	13	8.830					20,528.48	10,295.16	334,401.27	146,114.84	146,114.84
111	36	11.538							292,516.15	146,258.07	146,258.07
112	31	23.102					61,727.79	30,126.62	609,703.81	292,197.47	292,197.47
113	16	7.477							176,199.18	88,099.59	88,099.59
114	38	8.907					13,284.79	6,293.70	302,008.23	134,309.47	134,309.47
115	13	13.637					71,911.21	35,981.11	406,984.12	195,445.35	195,445.35
116	78	11.165					29,083.56	14,050.01	418,346.12	163,154.99	163,154.99
117	59	4.497					9,850.54	5,484.48	137,712.26	61,970.52	61,970.52
118	154	7.896					33,676.28	17,236.07	295,542.21	135,949.42	135,949.42
119		Withdrawn									
120	91	10.194					85,968.08	23,977.74	346,146.54	141,737.81	141,737.81
121	86	11.775					375,438.41	187,719.20			
122	78	5.235					22,564.40	11,282.20	146,954.39	73,477.19	73,477.19
123	172	5.211					97,352.34	40,448.66	114,878.36	45,951.34	45,951.34
124	122	8.562					37,840.90	18,920.45	214,759.10	107,379.55	107,379.55

TABLE VIII—Concluded.

Project number.	S. B. I. route number.	Length, miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total actual cost.	Amount requested.	Amount received.
125	140	20.746	$468,000.00	$234,000.00	----------	----------	$ 105,722.43	$ 53,799.32	$ 54,976.22	$ 26,550.00	$ 26,550.00
126	88	12.899	----------	----------	----------	----------	23,742.00	12,568.78	407,822.57	202,046.03	202,046.03
127	151	8.281	----------	----------	----------	----------	199,587.69	89,449.05	79,566.03	39,783.01	39,783.01
128	96	7.548	239,989.84	119,994.92	----------	----------	21,832.09	11,610.65	314,609.46	135,439.29	135,439.29
129	80	19.763	----------	----------	----------	----------	461,946.85	190,414.28	----------	----------	----------
130	74	15.156	120,000.00	60,000.00	$ 93,820.09	$ 31,993.60	93,308.47	39,290.24	519,945.77	197,579.39	197,579.39
131	121	6.886	----------	----------	----------	----------	35,547.49	17,773.75	95,809.05	47,904.52	47,904.52
132	63	7.776	----------	----------	----------	----------	209,270.23	69,504.82	94,270.37	47,135.18	47,135.18
133	125	8.342	----------	----------	----------	----------	33,399.89	15,601.98	213,944.38	103,372.24	103,372.24
134	99	5.560	----------	----------	----------	----------	8,048.83	4,024.41	160,277.52	80,138.76	80,138.76
135	121	51.958	666,000.00	333,000.00	----------	----------	212,865.28	106,089.61	764,199.29	365,514.01	365,514.01
136	89	24.642	105,000.00	52,500.00	----------	----------	359,407.00	178,737.21	317,093.35	158,546.67	158,546.67
137	98	21.750	----------	----------	----------	----------	649,930.10	311,890.16	27,731.68	13,865.84	13,865.84
138	150	17.200	276,000.00	138,000.00	----------	----------	257,216.24	128,376.92	----------	----------	----------
139	49	24.748	----------	----------	----------	----------	1,152,161.45	331,167.69	280,169.12	75,645.66	75,645.66
140	51	24.132	----------	----------	607,822.88	216,627.38	117,670.62	47,622.45	322,625.41	140,860.45	140,860.45
141	50	10.806	----------	----------	----------	----------	430,278.39	165,871.69	----------	----------	----------
142	70	42.798	----------	----------	----------	----------	201,680.41	218,634.69	1,066,570.15	530,852.01	413,011.83
143	83	35.863	730,000.00	365,000.00	----------	----------	43,852.12	32,425.07	379,603.19	189,901.59	178,956.87
144	85	1.732	----------	----------	----------	----------	11,450.15	5,047.34	63,657.32	26,736.07	26,736.07
145	95	10.140	----------	----------	----------	----------	27,613.92	13,806.96	280,664.00	140,332.00	140,332.00
146	152	Withdrawn									
147	157	17.981	520,000.00	260,000.00	----------	----------	78,080.14	32,102.65	96,210.69	37,522.17	37,522.17
148	152	17.706	----------	----------	----------	----------	184,114.14	90,092.22	347,019.97	172,182.50	172,182.50
149	162	12.249	----------	----------	----------	----------	16,510.50	8,255.25	305,794.97	152,897.48	152,897.48
150	88	31.093	25,000.00	12,500.00	----------	----------	413,424.42	206,650.87	558,514.22	275,745.80	275,745.80
151	58	27.397	120,000.00	60,000.00	----------	----------	816,847.30	320,360.41	408,171.21	134,696.50	134,696.50
152	160	27.852	600,000.00	300,000.00	----------	----------	306,553.11	153,276.55	15,786.51	7,893.25	7,893.25
153	122	29.897	500,000.00	250,000.00	----------	----------	21,282.05	10,641.02	365,067.34	182,533.67	182,533.67
154	147	11.315	189,859.10	94,929.55	----------	----------	----------	----------	----------	----------	----------
155	80	27.393	530,000.00	265,000.00	----------	----------	270,692.59	131,619.13	94,125.50	44,238.98	44,238.98
156	164	26.954	----------	----------	134,606.05	67,303.02	310,394.77	153,886.95	556,310.23	275,976.13	275,976.13
157	47	8.328	----------	----------	----------	----------	76,945.06	38,230.47	155,081.04	74,438.90	74,438.90
158	47	25.421	775,000.00	387,500.00	----------	----------	68,776.79	34,388.39	----------	----------	----------
159	48	6.753	----------	----------	----------	----------	203,794.39	101,897.19	----------	----------	----------
160	48	13.325	----------	----------	----------	----------	346,680.60	173,340.30	----------	----------	----------
161	146	Withdrawn									
162	103	Withdrawn									
163	121	Withdrawn									
164	78	18.514	265,000.00	182,500.00	----------	----------	216,339.36	107,379.33	----------	----------	----------
		2,564.204	$6,129,848.94	$3,114,924.47	$836,249.02	$315,924.00	$9,782,836.35	$4,450,100.87	$65,934,257.31	$31,019,094.18	$30,890,309.28

TABLE IX—REFUND TO COUNTIES FOR PAVEMENT UTILIZED IN THE STATE BOND ISSUE SYSTEMS.

County.	Miles of pavement.	Refund.*	County.	Miles of pavement.	Refund.*
Bond	3.407	$ 119,276.45	Macoupin	5.709	$ 179,902.24
Boone	.498	3,762.32	Madison	18.657	603,640.06
Bureau	1.933	12,854.54	Mason	1.433	54,066.22
Carroll	1.152	9,696.94	McHenry	1.795	10,161.59
Cass	.739	3,450.54	McLean	2.652	47,276.88
Champaign	10.023	81,899.26	Menard	1.122	51,242.44
Clark	6.102	126,258.68	Monroe	1.350	7,035.03
Coles	4.477	34,369.89	Morgan	1.149	7,966.07
Cook	52.022	1,237,612.26	Ogle	4.281	77,365.25
Cumberland	2.976	92,312.41	Peoria	19.563	305,271.74
DeKalb	7.754	78,341.46	Piatt	1.591	11,235.62
Douglas	6.847	68,200.91	Pike	1.605	8,066.39
DuPage	6.541	122,900.47	Putnam	.665	19,000.00
Edgar	2.013	14,148.08	Rock Island	.531	2,746.47
Edwards	.237	1,498.69	Sangamon	21.431	568,467.20
Effingham	7.219	107,567.51	Schuyler	1.566	10,904.79
Fayette	6.224	147,258.26	Shelby	1.603	17,554.03
Fulton	5.491	101,459.93	St. Clair	28.272	1,325,308.33
Grundy	3.747	120,001.45	Stephenson	1.136	12,838.53
Iroquois	4.077	110,578.51	Tazewell	6.816	145,468.60
Jersey	.587	1,836.64	Vermilion	46.836	544,156.61
Kane	39.996	966,168.11	Warren	3.806	31,470.74
Kankakee	15.679	262,481.27	Whiteside	4.521	78,354.29
Lake	22.920	608,088.92	Will	13.488	392,068.63
LaSalle	3.031	21,529.05	Williamson	8.181	98,770.57
Lee	6.030	100,713.67	Winnebago	7.480	175,386.67
Livingston	3.599	26,581.78			
			Total	432.560	$9,366,572.99

* Refund for pavement, grading and bridges included in total.

TABLE X—REFUNDS TO CITIES.

Route.	City.	Miles.	Amount.
37	Benton	1.418	$31,213.95
4	Bloomington	.497	6,612.48
2	Carbondale	.207	5,896.08
13	do	.292	8,684.69
4	Carlinville	.169	5,734.70
10	Champaign	.496	11,710.61
16	Charleston	.422	11,532.06
11	Effingham	.322	9,944.24
25	do	.102	2,464.63
11	Greenville	.791	25,936.36
10	Jacksonville	.189	4,837.39
37	Johnston City	.756	21,915.36
28	Kewanee	1.695	47,495.25
4	Normal	.536	14,000.38
2	Oglesby	.369	12,116.96
2	Pana	.751	22,213.74
6	Rochelle	.880	24,970.41
27	Savanna	.081	2,230.50
25	Urbana	.220	5,470.56
2	Vandalia	.753	23,654.05
11	do	.067	2,024.85
	Total	11.013	$300,659.25

TABLE XI—STATUS OF STATE AID MILEAGE.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Adams	2	1,538.00	384.50	382.00	2.50
Alexander	1	427.00	85.40	60.55	24.85
Bond	1	655.00	131.00	130.00	1.00
Boone	1	492.00	98.40	88.45	9.95
Brown	1	513.00	102.60	94.00	8.60
Bureau	2	1,481.00	370.25	345.35	24.90
Calhoun	1	317.80	63.56	59.80	3.76
Carroll	1	748.00	149.60	139.35	10.25
Cass	1	570.00	114.00	115.50	-
Champaign	2	1,910.00	477.50	390.13	87.37
Christian	2	1,269.00	317.25	260.30	56.95
Clark	1	994.00	198.80	199.45	-
Clay	1	842.00	168.40	158.30	10.10
Clinton	1	704.00	140.80	108.35	32.45
Coles	2	968.00	242.00	199.35	42.65
Cook	3	1,614.00	807.00	742.92	64.08
Crawford	1	821.00	164.20	126.45	37.75
Cumberland	1	687.00	137.40	100.25	37.15
DeKalb	2	1,089.00	272.25	233.48	38.77
DeWitt	1	732.00	146.40	113.50	32.90
Douglas	1	790.00	158.00	102.10	55.90
DuPage	2	776.00	194.00	188.85	5.15
Edgar	2	1,105.00	276.25	249.83	26.42
Edwards	1	414.00	82.80	67.60	15.20
Effingham	1	956.00	191.20	146.30	44.90
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	130.60	39.00
Franklin	1	648.00	129.60	130.20	-
Fulton	2	1,488.00	372.00	350.75	21.25
Gallatin	1	440.00	88.00	76.00	12.00
Greene	1	805.00	161.00	159.35	1.65
Grundy	1	756.75	151.35	142.95	8.40
Hamilton	1	817.00	163.40	162.80	0.60
Hancock	2	1,452.00	363.00	239.80	123.20
Hardin	1	245.00	49.00	40.55	8.45
Henderson	1	595.00	119.00	101.40	17.60
Henry	2	1,401.00	350.25	285.80	64.45
Iroquois	2	2,108.00	527.00	429.10	97.90
Jackson	2	977.00	244.25	203.50	40.75
Jasper	1	960.00	192.00	156.45	35.55
Jefferson	2	1,100.00	275.00	245.45	29.55
Jersey	1	572.00	114.40	98.20	16.20
JoDaviess	2	883.00	220.75	163.90	56.85
Johnson	1	432.00	86.40	75.75	10.65
Kane	2	836.00	209.00	208.95	0.05
Kankakee	2	1,300.00	325.00	242.62	82.38
Kendall	1	508.00	101.60	98.10	3.50
Knox	2	1,308.85	327.21	328.47	-
Lake	2	850.70	212.68	207.69	4.99
LaSalle	2	2,006.00	501.50	382.03	119.47
Lawrence	1	662.00	132.40	128.85	3.55
Lee	2	1,229.00	307.25	311.38	-
Livingston	2	2,029.00	507.25	363.25	144.00
Logan	2	957.00	239.25	192.35	46.90
McDonough	2	1,094.00	273.50	263.80	9.70
McHenry	2	993.00	248.25	242.25	6.00
McLean	2	2,080.00	520.00	311.05	208.95
Macon	2	1,027.00	256.75	213.65	43.10
Macoupin	2	1,427.00	356.75	295.17	61.58
Madison	2	1,169.00	292.25	243.60	48.65
Marion	2	1,138.00	284.50	249.80	34.70
Marshall	1	618.00	123.60	121.02	2.58
Mason	1	798.00	159.60	141.10	18.50
Massac	1	368.00	73.60	59.25	14.35
Menard	1	506.00	101.20	97.45	3.75
Mercer	1	911.00	182.20	147.00	35.20
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1,258.00	314.50	252.10	62.40
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	120.85	2.75
Ogle	2	1,330.00	332.50	332.20	0.30
Peoria	2	1,099.75	274.93	268.10	6.83
Perry	1	706.00	141.20	123.85	17.35
Piatt	1	764.00	152.80	146.40	6.40
Pike	2	1,542.00	385.50	285.75	99.75
Pope	1	559.30	111.86	106.05	5.81

TABLE XI—Concluded.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Pulaski	1	334.50	66.90	55.15	11.75
Putnam	1	270.00	54.00	45.45	8.55
Randolph	2	886.00	221.50	179.00	42.50
Richland	1	809.00	161.80	147.70	14.10
Rock Island	2	688.00	172.00	169.05	2.95
St. Clair	2	1,279.00	319.75	294.15	25.60
Saline	1	609.00	121.80	87.00	34.80
Sangamon	2	1,401.00	350.25	238.20	112.05
Schuyler	1	840.00	168.00	154.75	13.25
Scott	1	363.00	72.60	73.30	----------
Shelby	2	1,495.00	373.75	278.85	94.90
Stark	1	531.00	106.20	112.05	----------
Stephenson	2	1,077.00	269.25	244.80	24.45
Tazewell	2	1,010.00	252.50	213.50	39.00
Union	1	626.00	125.20	120.80	4.40
Vermilion	2	1,558.00	389.50	331.30	58.20
Wabash	1	380.00	76.00	70.50	5.50
Warren	1	990.00	198.00	135.70	62.30
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	236.20	40.00
White	2	992.00	248.00	186.46	61.54
Whiteside	2	1,130.00	282.50	272.00	10.50
Will	2	1,611.00	402.75	388.90	13.85
Williamson	2	827.00	206.75	161.65	45.10
Winnebago	2	1,025.53	256.38	252.05	4.33
Woodford	1	941.00	188.20	161.10	27.10
Total	--------	$97,287.18	$23,011.27	$19,748.55	$3,277.41

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

Class.	Number of counties.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
1	52	34,280.35	6,856.07	6,006.62	858.75
2	49	61,392.83	15,348.20	12,999.01	2,354.58
3	1	1,614.00	807.00	742.92	64.08
Total	102	97,287.18	23,011.27	19,748.55	3,277.41

TABLE XII—PRELIMINARY GRADE SEPARATION PLANS PREPARED.

Route.	Section.	County.	Near.	Railroad.	Estimated cost.
5	3-V	Cook	Elmhurst	C. & N. W	$ 57,430.00
18	8-V	Cook	LaGrange	I. H. B	204,447.55
49	143-V	Will	Monee	I. C	55,067.35
54	541-V	Cook	Elmhurst	C. & N. W	79,025.00
63	631-V	Cook	Barrington	E. J. & E	36,654.75
64	130-V	DuPage	Ingalton	E. J. & E	62,587.10
64	130-V1	DuPage	West Chicago	C. A. & E	56,625.10
86	105-V	Whiteside	Galt	C. & N. W	16,867.84
88	121-V	Bureau	Buda	C. R. I. & P	15,555.77
89	125-V	Marshall	LaRose	Santa Fe	70,002.36
142	113-V	Jefferson	Belle Rive	S. I. & K	16,149.78
143	101-V	Franklin	Benton	S. I. & K	22,763.55
143	102-V	Franklin	Thompsonville	S. I. & K	21,401.20
149	106-V	Franklin	West Frankfort	C. B. & Q	16,428.93
157	118-V	St. Clair	Caseyville	Penn	26,385.24
160	133-V	Madison	Bethalto	Big Four	12,718.12
164	119-VB	Tazewell	Mackinaw	I. T. S	10,501.44

Total—Number, 17—Estimated cost, $780,611.08.

TABLE XIII—COMPLETE GRADE SEPARATION PLANS PREPARED.

Route.	Section.	County.	Near.	Railroad.	Estimated cost.
2	38-V	Ogle	Oregon	C. B. & Q	$19,612.00
7	8-V	Bureau	Sheffield	C. R. I. & P	22,416.54
39	12-V	Piatt	Mansfield	Wabash	19,877.92
64	130-V	DuPage	Ingalton	C. & N. W. and E. J. & E	77,416.65
64	130-V1	DuPage	West Chicago	C. A. & E	55,065.70
74	101-V	Stephenson	Orangeville	I. C	54,868.59
86	105-V	Whiteside	Galt	C. & N. W	24,123.15
121	105-VB	Tazewell	Morton	Vandalia	30,684.26
160	134-VB	Madison	Carpenter	Big Four	13,441.12
160	135-VB	Madison	Carpenter	Wabash	11,899.20
164	119-VB	Tazewell	Mackinaw	I. T. S	11,786.50

Total—Number, 11—Estimated cost, $341,191.63.

TABLE XIV—CONTRACTS AWARDED FOR GRADE SEPARATION STRUCTURES.

Route.	Section.	County.	Near.	Railroad.	Contract price.
2	38-V	Ogle	Oregon	C. B. & Q	$19,945.18
4	6-V	Grundy	Gardner	C. & A	28,766.97
6	F-V-3	Cook	Westchester	C. W. & W	35,317.66
18	11-V	DuPage	Aurora	E. J. & E	25,034.35
39	12-V	Piatt	Mansfield	Wabash	21,402.46
49	142-V	Will	Monee	I. C	3,753.68
64	130-V1	DuPage	West Chicago	C. A. & E	39,752.70
74	101-V	Stephenson	Orangeville	I. C	51,788.88
89	101-V	Lee	Dixon	C. & N. W	23,573.55
121	105-VB	Tazewell	Morton	Vandalia	29,189.59
164	119-VB	Tazewell	Mackinaw	I. T. S	11,490.10

Total—Number, 11—Estimated cost, $290,015.12.

TABLE XV—BRIDGE PLANS PREPARED AND CONTRACTS AWARDED FROM 1906 TO 1928.

Year.	Plans and specifications prepared.	Estimated cost.	Contracts let on State plans.	Contract price.	Foreign plans approved.
1906	15		11	$ 37,035.00	Plans prepared by county superintendent of highways and others outside of Division of Highways.
1907	113		48	41,519.00	
1908	149		64	165,674.00	
1909	122		92	133,285.00	
1910	203		141	148,432.00	
1911	241		127	238,903.00	
1912	214		150	212,694.00	
1913	238	$ 342,052.00	139	200,834.00	5
1914	269	470,363.00	109	184,792.00	269
1915	707	984,420.00	565	541,509.00	230
1916	735	1,169,743.00	439	566,657.00	653
1917	480	812,614.00	502	582,993.00	503
1918	206	499,702.00	169	277,130.00	443
1919	231	761,458.68	202	514,897.00	725
1920	443	2,841,896.22	301	2,208,494.84	261
1921	384	2,134,476.49	337	1,909,455.67	362
1922	374	2,365,726.45	317	1,775,066.00	839
1923	484	3,359,109.03	413	3,170,269.46	1,451
1924	420	4,220,819.17	258	1,594,035.90	886
1925	340	2,972,560.80	283	2,940,774.86	1,215
1926	281	3,782,267.84	164	2,702,055.34	1,145
1927	402	3,991,491.67	310	2,137,389.93	1,516
1928	590	7,691,006.93	563	6,537,807.43	1,749
Total	7,641	$38,399,707.28	5,704	$28,821,703.43	12,252

TABLE XVI—SUMMARY SHOWING AMOUNTS AND TYPES OF PAVEMENT CONSTRUCTED DURING 1928.

Type.	60 million.		100 million.		County 15d miles.	Total miles.
	Bond issue, miles.	Federal aid, miles.	Bond issue, miles.	Federal aid, miles.		
4′ concrete				0.76		0.76
8′ concrete	1.83		5.18			7.01
9′ concrete			24.90	2.09	10.75	37.74
10′ concrete	0.59		0.43		15.59	16.61
16′ concrete					8.97	8.97
18′ concrete	47.44	5.92	590.73	229.53	35.79	909.41
20′ concrete	3.14	5.83	39.70	47.69	108.08	204.44
22′ concrete			2.03		28.73	30.76
24′ concrete	1.27					1.27
30′ concrete	.32					.32
36′ concrete					.70	.70
40′ concrete	.22		14.90	22.57	7.25	44.94
18′ asphalt concrete	.09					.09
10′ brick			.92			.92
18′ brick			26.80			26.80
20′ brick	.39					.39
14′ gravel					8.40	8.40
16′ gravel					1.85	1.85
20′ gravel					3.37	3.37
Total	55.29	11.75	705.59	302.64	229.48	1,304.75

2.87 miles of pavement built by special appropriation not included in the above totals.

TABLE XVII—SUMMARY OF 1928 CONSTRUCTION.

Construction program.	Pavement, miles.	Grading, miles.	Bridges, number.
Carried over from 1927	370.75	130.22	92
Awarded during 1928	1,428.28	385.28	403
Additions to contracts	31.13		21
Deductions from contracts		25.68	
Total under contract—1928	1,830.15	489.82	516
Constructed—1928	1,304.75	340.25	360
Carried over uncompleted	525.40	149.57	156

Note—The total pavement constructed during 1928 does not include 2.87 miles built with special appropriations by the legislature.

PAVEMENT, GRADING AND BRIDGE CONTRACTORS HAVING STATE OR COUNTY WORK.

Pavement contractors, including county work under Section 15-d of the road and bridge laws	142
Grading contractors, including county 15-d work	73
Bridge contractors, including county 15-d work	105
Total	320

SECTIONS UNDER CONTRACT.

Rigid Type Pavement.

S. B. I. and F. A.	352
County 15-d	139
Miscellaneous	3
Total	494

Non-rigid Type Pavement.

Gravel	8

Grading.

S. B. I. and F. A.	113
County 15-d	36
Miscellaneous	1
Total	150

Bridge.

S. B. I. and F. A.	286
County 15-d	27
Miscellaneous	2
Total	315

TABLE XVIII—WORK CONSTRUCTED BY STATE-OWNED OUTFITS.

Pavement:

Route.	Section.	Type.	Width, feet.	Length, miles.
49	140	Concrete	40	6.9
98	108	Concrete	18	9.0
125	106	Concrete	18	0.7
108	101	Concrete	18	2.8
108	102	Concrete	18	7.2
108	103	Concrete	18	3.1
24	L-R	Concrete	24	0.1
49	139	Concrete	18	7.4
113	109-110	Concrete	9	1.5
113	109-110	Concrete	18	0.7
Total				39.4

Bridges: Route 49, Section 140-B: Route 98, Section 108-S—subway.
Grading: Route 36—approach fill at Florence Bridge.
Macadam shoulders adjacent to pavement: Route 113, Sections 111 and 112.
Guard fence: 52.5 miles.

TABLE XIX—TOTAL MILEAGE OF PAVEMENT AVAILABLE TO TRAFFIC IN EACH COUNTY JANUARY 1, 1929.

County.	State bond issue.	Federal aid.	State aid.	County 15d.	Miscellaneous.	Total.
Adams	75.31	19.58	4.21	0	2.87	101.97
Alexander	9.07	0	9.58	19.62	0	38.27
Bond	11.14	20.86	1.48	7.54	0	41.02
Boone	29.43	0	3.70	0.34	0	33.47
Brown	10.27	7.62	0	0	0	17.89
Bureau	29.52	74.23	8.96	19.15	0	131.86
Calhoun	10.05	0	1.30	0	0	11.35
Carroll	32.51	25.70	3.53	5.97	0	67.71
Cass	12.18	14.36	3.93	0	0	30.47
Champaign	67.90	19.61	2.54	125.92	0	215.97
Christian	47.40	18.02	0	0	1.06	66.48
Clark	30.64	30.90	1.41	6.26	0	69.21
Clay	38.97	3.54	1.35	0	0	43.86
Clinton	33.47	11.88	1.38	0	0	46.73
Coles	41.44	11.76	0.44	0.89	0	54.53
Cook	79.91	46.19	34.81	506.01	2.11	669.03
Crawford	42.69	0	1.71	0	0	44.40
Cumberland	16.22	20.93	2.23	8.47	0	47.85
DeKalb	34.86	29.41	6.01	2.61	0	72.89
DeWitt	21.39	0	0	0	0	21.39
Douglas	24.65	15.71	1.76	20.10	0	62.22
DuPage	59.81	12.18	0.10	49.22	0	121.31
Edgar	36.79	21.76	3.67	2.03	0	64.25
Edwards	17.47	0	0.88	0.54	0	18.89
Effingham	33.48	24.44	0.70	0.38	0	59.00
Fayette	33.47	25.15	1.93	0	0	60.55
Ford	37.44	28.90	2.02	0	0	68.36
Franklin	60.40	6.49	3.14	4.96	0	74.99
Fulton	64.56	47.56	2.82	5.57	0.39	120.90
Gallatin	16.44	0	0	0	0	16.44
Greene	34.71	5.63	0	0	0	40.34
Grundy	20.38	26.46	4.04	5.06	0	55.94
Hamilton	18.69	0	0	0	0	18.69
Hancock	43.10	22.15	0	0	0	65.25
Hardin	0	13.99	0	0	0	13.99
Henderson	25.32	0	0.51	0	0	25.83
Henry	77.32	6.26	2.11	0	0	85.69
Iroquois	88.24	57.68	9.21	132.40	0	287.53
Jackson	41.20	3.55	1.50	0	0.25	46.50
Jasper	45.39	0	0	0	0	45.39
Jefferson	23.53	12.31	0.72	0	0	36.56
Jersey	24.50	7.16	0	0.15	0	31.81
JoDaviess	45.10	22.48	0.26	0	0	67.84
Johnson	17.24	5.48	0	0	0	22.72
Kane	23.71	22.58	9.16	60.94	0	116.39
Kankakee	72.84	63.41	4.14	22.08	0	162.47

TABLE XIX—Concluded.

County.	State bond issue.	Federal aid.	State aid.	County 15d.	Miscellaneous.	Total.
Kendall	15.34	9.41	3.22	0	0	27.97
Knox	54.00	22.39	0	1.86	0	78.25
Lake	43.41	46.67	6.17	91.22	0	187.47
LaSalle	103.98	35.85	10.08	0	2.61	152.52
Lawrence	39.53	0	3.63	0	0	43.16
Lee	9.44	64.51	1.77	11.65	3.21	90.58
Livingston	114.00	38.90	4.74	3.46	5.49	166.59
Logan	7.33	23.94	3.18	0	0	34.45
Macon	44.59	16.67	0	0	0	61.26
Macoupin	28.27	44.46	0.56	3.35	0	76.64
Madison	35.74	59.61	10.46	30.21	1.40	137.42
Marion	43.23	6.61	1.55	0	0	51.39
Marshall	34.66	26.21	0	0	0	60.87
Mason	13.88	36.38	0.57	3.26	0	54.09
Massac	4.14	9.66	0	0	0	13.80
McDonough	38.01	41.55	0	0	0	79.56
McHenry	64.57	42.85	3.88	0	0	111.30
McLean	91.04	84.38	1.85	5.33	0.14	182.74
Menard	14.31	13.44	1.53	1.99	0.95	32.22
Mercer	21.79	11.65	0	0	0	33.44
Monroe	16.77	15.30	0.47	0.36	0	32.90
Montgomery	15.85	17.76	0	0	0	33.61
Morgan	36.66	6.12	1.61	0.37	0	44.76
Moultrie	21.95	15.47	2.91	0	0	40.33
Ogle	56.65	47.08	8.04	18.76	0	130.53
Peoria	53.78	62.46	5.10	18.94	0.33	140.61
Perry	41.65	28.74	0	0	0	70.39
Piatt	42.21	7.59	5.78	11.04	0	66.62
Pike	19.94	18.36	3.78	0	0	42.08
Pope	0	10.99	0	0	0	10.99
Pulaski	4.42	14.81	0.69	0	0	19.92
Putnam	14.63	6.43	0.99	1.58	0	23.63
Randolph	30.50	19.10	0	0	0	49.60
Richland	18.68	7.35	0	0	0	26.03
Rock Island	34.16	0.67	1.84	15.64	0	52.31
Saline	41.05	20.22	1.55	0	0.78	63.60
Sangamon	43.53	59.08	8.54	27.95	0	139.10
Schuyler	8.89	34.03	1.63	5.15	0	49.70
Scott	21.00	0	0	0	0	21.00
Shelby	58.69	0	0.61	0.60	0	59.90
Stark	23.02	15.80	0	0	0	38.82
St. Clair	44.19	43.36	3.01	64.54	0.53	155.63
Stephenson	30.52	13.12	3.26	1.79	0	48.69
Tazewell	30.41	42.21	1.51	5.07	0	79.20
Union	11.36	10.87	0	0	0.93	23.16
Vermilion	87.45	5.99	1.15	132.40	2.80	229.79
Wabash	24.52	0	1.72	0	0	26.24
Warren	39.27	20.35	1.09	1.14	0	61.85
Washington	54.10	0.42	0	0	0	54.52
Wayne	47.32	0	0	0	0	47.32
White	46.64	5.85	6.20	0	0	58.69
Whiteside	15.65	64.53	6.61	4.27	2.91	93.97
Will	81.71	64.29	11.96	37.15	0.78	195.89
Williamson	37.16	0	0.12	11.23	0	48.51
Winnebago	29.40	4.78	7.34	47.71	0	89.23
Woodford	58.76	26.60	1.40	0	0	86.76
Total	3,723.90	2,150.79	279.34	1,564.23	29.54	7,747.80

NOTE—The above totals include the following various types:

Concrete	7,273.63
Brick	169.79
Sheet asphalt	34.21
Bituminous concrete	6.87
Bituminous macadam	17.31
Waterbound macadam	58.85
Gravel	187.14
Net mileage available for traffic	7,747.80

TABLE XX—CRUSHED STONE SHIPPED FROM JOLIET AND MENARD PENITENTIARIES DURING 1928.

Shipped to.	Joliet.	Menard.	Total.
	Cubic yards.	Cubic yards.	Cubic yards.
S. B. I. construction	10,545	3,105	13,650
S. B. I. maintenance	6,251		6,251
State institutions	8,351		8,351
Townships	24,036	4,463	28,499
Total	49,183	7,568	56,751

TABLE XXI—QUANTITY OF MATERIALS ACCEPTED BY PLANT INSPECTION AND UNIT COST OF INSPECTION FOR THE CALENDAR YEAR 1928.

Material.	Total quantity accepted.	Unit cost inspection.	
		Without overhead.	With overhead.
Aggregate	4,369,261 cu. yds.	$0.029 cu. yd.	$0.035 cu. yd.
Asphalt	4,978.67 tons	0.329 ton	0.387 ton
Cement	4,904,968 bbls.	0.0096 bbl.	0.0123 bbl.
Lumber	2,050,821 bd. ft.	0.779 M bd. ft.	0.918 M bd. ft.
Paint	35,829 gals.	0.033 gal.	0.058 gal.
Paving brick	8,874,000	0.163 M	0.204 M
Corrugated metal culverts	3,580 ft.	0.035 ft.	0.049 ft.
Steel—Chicago district	46,565,056 lbs.	0.366 ton	0.48 ton
Steel—St. Louis district	25,561,961 lbs.	0.292 ton	0.339 ton
*Steel—Kansas City, Mo	714,297 lbs.	0.50 ton	

In addition 878,100 paving brick, 26,107 tile and 1,865,855 lbs. of steel were inspected at various plants and destinations.

* Inspection conducted by Missouri State Highway Department.

TABLE XXII—QUANTITIES OF MATERIALS INSPECTED FOR OTHER DEPARTMENTS OF THE STATE OF ILLINOIS AND FOR OTHER STATES DURING THE CALENDAR YEAR 1928.

Account.	Quantity inspected.		
	Aggregate.	Cement.	Steel.
State of Illinois—			
Department of Public Welfare		10,836 bbls.	
Division of Waterways	109,501 cu. yds.	111,883 bbls.	
State of Iowa		83,418 bbls.	4,117,183 lbs.
State of Michigan		2,772 bbls.	
State of Minnesota			1,754,325 lbs.
State of Missouri		462 bbls.	148,651 lbs.
State of Tennessee			486,880 lbs.
State of Wisconsin			6,732,280 lbs
Total	109,501 cu. yds.	209,371 bbls.	13,239,319 lbs.

TABLE XXIII—PAINT HANDLED BY BUREAU OF MATERIALS DURING THE CALENDAR YEAR 1928.

Inventory.		Inventory, gallons.
On hand January 1, 1928—		
Blue lead paint	4,620 Gals.	
White lead paint	5,921 Gals.	
Highway yellow paint	150 Gals.	
Red enamel	13 Gals.	
Asphalt paint	19½ Gals.	
Total		10,723½
Received during year, 1928—		
Blue lead paint	20,267 Gals.	
White lead paint	15,450 Gals.	
Stencil paint	112 Gals.	
Total		35,829
		46,552½

Account.	Paint furnished—gallons.					
	Stencil paint.	*R. E. **A. P.	Blue lead paint.	White lead paint.	Highway yellow paint.	
Lost in transit—claim filed with railway company			2	10		
Furnished free to contractors in accordance with terms of contracts			16,032¾	3,240		
Charged to contractors, account used in excess of maximum amount allowed by contract			222	60		
Furnished for miscellaneous State work, paint paid for by contractor			14	83		
Furnished for township and county work, paint paid for by county or contractor			1,900½	464		
Bureau of Construction—						
General			10			
Day labor			600	1,025		
Bureau of Design						
Bureau of Machinery			65	1		
Bureau of Maintenance—						
District No. 1	20		100	800		
District No. 2	7		60	525		
District No. 3	5		55	950		
District No. 4	5	*1**19½	50	1,550	40	
District No. 5	35			850	35	
District No. 6	20		71	904		
District No. 7	5			2,250		
District No. 8	5			1,440	70	
District No. 9	10	*2		1,150		
Bureau of Materials			9¼	34	5	
Department of Agriculture				70		
Total	112	*3**19½	19,191½	15,406	150	
Less paint furnished during 1928						34,882
On hand January 1, 1929—						
Blue lead paint 5,695½ Gals.						
White lead paint 5 965 Gals.						
Red enamel 10 Gals.						
Balance						11,670½

* R. E.=Red enamel.
** A. P =Asphalt paint

TABLE XXIV—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF SURFACED ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1928 IN ALL DISTRICTS.

District.	Portland cement concrete.		Brick.		Bituminous concrete.		Bituminous macadam	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1	195	1,168.84	3	2.42	14	42.55	2	9.15
No. 2	72	607.43	6	11.20			4	7.61
No. 3	110	918.04	8	5.91			2	1.79
No. 4	113	710.37	11	32.74				
No. 5	100	813.74	28	78.61				
No. 6	71	570.72	9	12.12			2	2.53
No. 7	66	546.33	4	9.20				
No. 8	71	464.64	5	16.88			1	2.07
No. 9	54	403.26	3	9.36			2	2.70
Total	852	6,203.37	77	178.44	14	42.55	13	25.85

TABLE XXIV—Concluded.

District.	Waterbound macadam.		Gravel.		Patrols consisting of bridges—100 ft. span or over.	Total.	
	Patrols.	Miles.	Patrols.	Miles.		Patrols.	Miles.
No. 1	9	26.26	3	4.61	58	284	1,253.83
No. 2	3	3.73	13	67.40	26	124	697.37
No. 3	1	2.00	8	32.64	27	156	960.38
No. 4			3	.97	33	160	744.08
No. 5			5	15.52	26	159	907.87
No. 6	2	7.25			23	107	592.62
No. 7	1	1.93	6	8.95	10	87	566.41
No. 8	3	4.65	3	5.18	21	104	493.42
No. 9			6	29.84	24	89	445.16
Total	19	45.82	47	165.11	248	1,270	6,661.14

TABLE XXV—NUMBER OF FILMS, PRINTS AND SLIDES PREPARED FOR THE VARIOUS BUREAUS DURING 1928.

Account.	Films.	Prints.	Slides.
Highway Executive Office	5	454	25
Bureau of Audits	18	119	
Bureau of Construction	45	286	
Bureau of Design	202	3,251	
Bureau of Maintenance	10	94	
Bureau of Materials	176	975	20
District No. 1	14	14	
District No. 4		104	
District No. 5	44	44	
District No. 6	70	969	
District No. 7	18	36	
District No. 9		63	
Total	602	6,409	45

TABLE XXVI—STATEMENT SHOWING COMPARISON OF MILES AND COST OF VARIOUS TYPES MAINTAINED DURING THE CALENDAR YEAR 1928.

	Portland cement concrete.	Brick.	Bituminous concrete.
Miles maintained	6,203.37	178.44	42.55
Maintenance of Wearing Surface—			
Paved surface	$448,419.55	$32,933.17	$8,844.00
Upkeep of Roadside—			
Metal shoulders	$ 15,595.87	$ 2,178.88	----------
Earth shoulders	433,383.55	14,590.27	$4,512.26
Ditches and drains	156,038.85	4,560.75	136.17
Bridges and culverts	26,526.39	874.31	61.18
Markers and safety signs	91,695.91	1,928.38	759.28
Guard fence	67,988.84	989.28	97.79
Cutting and clearing vegetation	313,626.89	8,897.46	2,103.55
Clearing right-of-way	104,272.86	1,935.09	662.54
Snow removal	147,172.28	5,723.88	686.62
Total upkeep	$1,356,301.44	$41,678.30	$9,019.39
Total maintenance and upkeep cost	$1,804,720.99	$74,611.47	$17,863.39

TABLE XXVI—Concluded.

	Bituminous macadam.	Waterbound macadam.	Gravel.	Total.
Miles maintained	25.85	45.82	165.11	6,661.14
Maintenance of Wearing Surface—				
Paved surface	$11,141.16	$18,576.26	$51,737.42	$571,651.56
Upkeep of Roadside—				
Metal shoulders	----------	----------	----------	$ 17,774.75
Earth shoulders	$1,818.18	$2,691.83	$1,620.83	458,616.92
Ditches and drains	1,370.49	1,824.26	4,197.43	168,127.95
Bridges and culverts	21.56	262.55	438.07	28,184.06
Markers and safety signs	89.41	231.84	239.59	94,944.41
Guard fence	56.53	----------	173.81	69,306.25
Cutting and clearing vegetation	819.81	1,293.28	4,404.19	331,145.18
Clearing right-of-way	119.21	179.16	318.19	107,487.05
Snow removal	807.72	1,866.45	325.44	156,582.39
Total upkeep	$5,102.91	$8,349.37	$11,717.55	$1,432,168.96
Total maintenance and upkeep cost	$16,244.07	$26,925.63	$63,454.97	$2,003,820.52

TABLE XXVII—STATEMENT SHOWING COMPARISON OF MILEAGES AND COSTS ON PER MILE BASIS BY TYPES AND UNITS FOR THE CALENDAR YEAR 1928.

	Portland cement concrete.	Brick.	Bituminous concrete.
Miles maintained	6,203.37	178.44	42.55
Maintenance of wearing surface—			
Paved surface	$72.29	$184.56	$207.84
Upkeep of roadside—			
Metal shoulders	$ 2.51	$12.21	
Earth shoulders	69.86	81.77	$106.04
Ditches and drains	25.16	25.56	3.20
Bridges and culverts	4.28	4.90	1.44
Markers and safety signs	14.78	10.80	17.85
Guard fence	10.96	5.54	2.30
Cutting and clearing vegetation	50.56	49.86	49.43
Cleaning right-of-way	16.81	10.85	15.58
Snow removal	23.73	32.08	16.14
Total upkeep	$218.65	$233.57	$211.98
Total maintenance and upkeep	$290.94	$418.13	$419.82

TABLE XXVII—Concluded.

	Bituminous macadam.	Waterbound macadam.	Gravel.
Miles maintained	25.85	45.82	165.11
Maintenance of wearing surface—			
Paved surface	$430.99	$405.42	$313.35
Upkeep of roadside—			
Metal shoulders			
Earth shoulders	$70.34	$58.75	$ 9.81
Ditches and drains	53.01	39.81	25.42
Bridges and culverts	.83	5.73	2.67
Markers and safety signs	3.46	5.06	1.45
Guard fence	2.19		1.04
Cutting and clearing vegetation	31.72	28.23	26 67
Cleaning right-of-way	4.61	3.91	1.94
Snow removal	31.25	40.73	1.97
Total upkeep	$197.41	$182.22	$70.97
Total maintenance and upkeep	$628.40	$587.64	$384.32

NOTE.—The costs per mile shown under bituminous macadam, waterbound macadam, and gravel do not represent a fair average cost for maintenance and upkeep of such types due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE XXVIII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 6,203.37 MILES OF CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface—				
Paved surface	348,818½	$170,113.95	$126,933.69	$45,414.34
Upkeep of roadside—				
Metal shoulders	12,197	$ 6,201.01	$ 1,872.91	$ 2,907.09
Earth shoulders	436,315½	215,608.66	8,975.41	72,697.75
Ditches and drains	165,759½	81,680.85	2,395.32	23,663.41
Bridges and culverts	26,026½	12,923.81	1,627.40	4,312.24
Markers and safety signs	84,422½	42,697.51	6,417.42	13,892.59
Guard fence	48,245	21,859.14	27,889.72	5,617.51
Cutting and clearing vegetation	355,904	188,991.61		35,482.87
Cleaning right-of-way	92,440	47,771.67		21,757.39
Snow removal	117,772½	59,593.16		36,609.71
Total upkeep	1,339,082½	$677,327.42	$49,178.18	$216,940.56
Total maintenance and upkeep costs	1,687,901	$847,441.37	$176,111.87	$262,354.90

TABLE XXVIII—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface—				
Paved surface	$342,461.98	$105,957.57	$448,419.55	$72.29
Upkeep of roadside—				
Metal shoulders	$ 10,981.01	$ 4,614.86	$ 15,595.87	$ 2.51
Earth shoulders	297,281.82	136,101.73	433,383.55	69.86
Ditches and drains	107,739.58	48,299.27	156,038.85	25.16
Bridges and culverts	18,863.45	7,662.94	26,526.39	4.28
Markers and safety signs	63,007.52	28,688.39	91,695.91	14.78
Guard fence	55,366.37	12,622.47	67,988.84	10.96
Cutting and clearing vegetation	224,474.48	89,152.41	313,626.89	50.56
Cleaning right-of-way	69,529.06	34,743.80	104,272.86	16.81
Snow removal	96,202.87	50,969.41	147,172.28	23.73
Total upkeep	$943,446.16	$412,855.28	$1,356,301.44	$218.65
Total maintenance and upkeep costs	$1,285,908.14	$518,812.85	$1,804,720.99	$290.94

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE XXIX—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 178.44 MILES OF BRICK ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface—				
Paved surface	29,952	$13,043.19	$9,769.33	$2,920.51
Upkeep of roadside—				
Metal shoulders	1,580	$ 804.24	$269.41	$ 441.18
Earth shoulders	14,979	7,191.95	124.73	2,564.95
Ditches and drains	4,567	2,145.29	100.90	910.88
Bridges and culverts	704½	342.47	128.78	133.71
Markers and safety signs	1,815½	866.33	60.70	395.84
Guard fence	650½	303.94	362.98	110.08
Cutting and clearing vegetation	10,131	5,207.23		1,101.07
Cleaning right-of-way	1,686	851.23		430.94
Snow removal	4,500	2,118.62		1,447.95
Total upkeep	40,613½	$19,831.30	$1,047.50	$7,536.60
Total maintenance and upkeep cost	70,565½	$32,874.49	$10,816.83	$10,457.11

TABLE XXIX—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface—				
Paved surface	$25,733.03	$7,200.14	$32,933.17	$184.56
Upkeep of roadside—				
Metal shoulders	$1,514.83	$ 664.05	$ 2,178.88	$12.21
Earth shoulders	9,881.63	4,708.64	14,590.27	81.77
Ditches and drains	3,157.07	1,403.68	4,560.75	25.56
Bridges and culverts	604.96	269.35	874.31	4.90
Markers and safety signs	1,322.87	605.51	1,928.38	10.80
Guard fence	777.00	212.28	989.28	5.54
Cutting and clearing vegetation	6,308.30	2,589.16	8,897.46	49.86
Cleaning right-of-way	1,282.17	652.92	1,935.09	10.85
Snow removal	3,566.57	2,157.31	5,723.88	32.08
Total upkeep	$28,415.40	$13,262.90	$41,678.30	$233.57
Total maintenance and upkeep cost	$54,148.43	$20,463.04	$74,611.47	$418.13

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XXX—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 42.55 MILES OF BITUMINOUS CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface—				
Paved surface	6,058	$3,250.62	$2,878.11	$890.52
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	3,398½	$2,200.69	$164.93	$975.51
Ditches and drains	121	65.99		20.99
Bridges and culverts	69	36.55		4.64
Markers and safety signs	570	305.47	24.18	86.32
Guard fence	72	37.96	26.16	10.54
Cutting and clearing vegetation	2,245	1,288.95		148.11
Cleaning right-of-way	641	345.83		78.62
Snow removal	544	368.08		127.23
Total upkeep	8,200½	$4,649.52	$215.27	$1,451.96
Total maintenance and upkeep costs	14,258½	$7,900.14	$3,093.38	$2,342.48

TABLE XXX—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface—				
Paved surface	$7,019.25	$1,824.75	$8,844.00	$207.84
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	$3,341.13	$1,171.13	$4,512.26	$106.04
Ditches and drains	86.98	49.19	136.17	3.20
Bridges and culverts	41.19	19.99	61.18	1.44
Markers and safety signs	415.97	343.31	759.28	17.85
Guard fence	74.66	23.13	97.79	2.30
Cutting and clearing vegetation	1,437.06	666.49	2,103.55	49.43
Cleaning right-of-way	424.45	238.09	662.54	15.58
Snow removal	495.31	191.31	686.62	16.14
Total upkeep	$6,316.75	$2,702.64	$9,019.39	$211.98
Total maintenance and upkeep costs	$13,336.00	$4,527.39	$17,863.39	$419.82

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* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE XXXI—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 25.85 MILES OF BITUMINOUS MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface— Paved surface	6,870	$3,345.64	$4,122.83	$1,387.59
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	1,706	$881.91		$299.41
Ditches and drains	1,335	714.51	6.78	134.42
Bridges and culverts	24	11.95		2.90
Markers and safety signs	89	45.59		9.49
Guard fence	27	14.45	25.00	6.71
Cutting and clearing vegetation	892½	476.31		83.50
Cleaning right-of-way	125	62.05		5.52
Snow removal	801½	409.31		117.93
Total upkeep	5,000	$2,616.08	$31.78	$659.88
Total maintenance and upkeep cost	11,870	$5,961.72	$4,154.61	$2,047.47

TABLE XXXI—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface— Paved surface	$8,856.06	$2,285.10	$11,141.16	$430.99
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	$1,181.32	$636.86	$1,818.18	$70.34
Ditches and drains	855.71	514.78	1,370.49	53.01
Bridges and culverts	14.85	6.71	21.56	.83
Markers and safety signs	55.08	34.33	89.41	3.46
Guard fence	46.16	10.37	56.53	2.19
Cutting and clearing vegetation	559.81	260.00	819.81	31.72
Cleaning right-of-way	67.57	51.64	119.21	4.61
Snow removal	527.24	280.48	807.72	31.25
Total upkeep	$3,307.74	$1,795.17	$5,102.91	$197.41
Total maintenance and upkeep cost	$12,163.80	$4,080.27	$16,244.07	$628.40

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* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under bituminous macadam do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE XXXII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 45.82 MILES OF WATERBOUND MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface—				
Paved surface	10,155½	$5,421.49	$5,843.73	$2,821.30
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	2,504	$1,307.01		$505.11
Ditches and drains	2,055	967.02		213.58
Bridges and culverts	262	128.41	$ 5.95	34.83
Markers and safety signs	183	90.17	28.15	36.63
Guard fence				
Cutting and clearing vegetation	1,475	800.51		82.57
Cleaning right-of-way	211	96.50		19.15
Snow removal	1,801	1,104.97		120.40
Total upkeep	8,491	$4,494.59	$34.10	$1,012.27
Total maintenance and upkeep cost	18,646½	$9,916.08	$5,877.83	$3,833.57

TABLE XXXII—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface—				
Paved surface	$14,086.52	$4,489.74	$18,576.26	$405.42
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	$1,812.12	$879.71	$2,691.83	$58.75
Ditches and drains	1,180.60	643.66	1,824.26	39.81
Bridges and culverts	169.19	93.36	262.55	5.73
Markers and safety signs	154.95	76.89	231.84	5.06
Guard fence				
Cutting and clearing vegetation	883.08	410.20	1,293.28	28.23
Cleaning right-of-way	115.65	63.51	179.16	3.91
Snow removal	1,225.37	641.08	1,866.45	40.73
Total upkeep	$5,540.96	$2,808.41	$8,349.37	$182.22
Total maintenance and upkeep cost	$19,627.48	$7,298.15	$26,925.63	$587.64

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XXXIII—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 165.11 MILES OF GRAVEL ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface—				
Paved surface	36,388	$19,528.58	$13,669.11	$5,878.46
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	1,573½	807.93	1.56	325.22
Ditches and drains	4,296½	2,024.21		815.79
Bridges and culverts	531	245.73	12.75	31.41
Markers and safety signs	240	120.87		14.08
Guard fence	113	46.60	33.22	66.52
Cutting and clearing vegetation	4,413½	2,272.55		977.10
Cleaning right-of-way	284½	141.80		76.24
Snow removal	316½	174.41		16.59
Total upkeep	11,768½	$5,834.10	$47.53	$2,322.95
Total maintenance and upkeep cost	48,156½	$25,362.68	$13,716.64	$8,201.41

TABLE XXXIII—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface—				
Paved surface	$39,076.15	$12,661.27	$51,737.42	$313.35
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	$1,134.71	$ 486.12	$1,620.83	$ 9.81
Ditches and drains	2,840.00	1,357.43	4,197.43	25.42
Bridges and culverts	289.89	148.18	438.07	2.67
Markers and safety signs	134.95	104.64	239.59	1.45
Guard fence	146.34	27.47	173.81	1.04
Cutting and clearing vegetation	3,249.65	1,154.54	4,404.19	26.67
Cleaning right-of-way	218.04	100.15	318.19	1.94
Snow removal	191.00	134.44	325.44	1.97
Total upkeep	$8,204.58	$3,512.97	$11,717.55	$70.97
Total maintenance and upkeep cost	$47,280.73	$16,174.24	$63,454.97	$384.32

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under gravel do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE XXXIV—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF DETOUR ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1928 IN ALL DISTRICTS.

District.	Earth.		Gravel.		Cinders.		Shale.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1			20	26.22				
No. 2	15	18.94	9	8.02	1	.01		
No. 3	2	24.23	9	21.07				
No. 4	7	8.41	46	18.08	3	.99		
No. 5	1	.57	4	.14				
No. 6	8	18.01	11	4.35	4	.27	2	1.25
No. 7	9	21.48	18	17.32	2	1.40		
No. 8	4	8.28	6	1.51	6	4.64		
No. 9	9	10.41	15	17.75	3	1.63		
Total	55	110.33	138	114.46	19	8.94	2	1.25

TABLE XXXIV—Concluded.

District.	Macadam.		Route marking.		Miscellaneous.		Total.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1	5	.59	17	42.95			42	69.76
No. 2	1	.50					26	27.47
No. 3	5	2.65	11	66.09	3	.71	30	114.75
No. 4			14	109.77			70	137.25
No. 5			4	10.02			9	10.73
No. 6			9	50.13			34	74.01
No. 7			7	41.10			36	81.30
No. 8	2	.40	8	21.03			26	35.86
No. 9	3	.38	12	66.25			42	96.42
Total	16	4.52	82	407.34	3	.71	315	647.55

TABLE XXXV—STATEMENT SHOWING COMPARISON OF MILES AND COST OF VARIOUS TYPES OF DETOUR ROADS MAINTAINED DURING THE CALENDAR YEAR 1928.

Account.	Earth.	Gravel.	Cinders.	Macadam.
Miles maintained	110.33	114.46	8.94	4.52
Maintenance of wearing surface—				
Paved surface	$31,306.29	$114,481.74	$21,345.69	$16,438.99
Upkeep of roadside—				
Metal shoulders	----------	----------	----------	----------
Earth shoulders	$311.34	$1,560.50	$ 694.03	$100.23
Ditches and drains	650.05	1,398.53	347.83	131.04
Bridges and culverts	697.04	1,039.66	653.27	42.52
Markers and safety signs	904.25	1,673.60	41.69	616.27
Guard fence	156.74	569.97	1,875.34	151.50
Cutting and clearing vegetation	142.59	2,722.64	118.55	20.67
Cleaning right-of way	4.12	22.34	65.73	10.18
Snow removal	399.31	656.65	48.35	47.78
Total upkeep	$3,265.44	$9,643.89	$3,844.79	$1,120.19
Total maintenance and upkeep cost	$34,571.73	$124,125.63	$25,190.48	$17,559.18

TABLE XXXV—Concluded.

Account.	Miscellaneous.	Shale.	Route marking.	Total.
Miles maintained	.71	1.25	407.34	647.55
Maintenance of wearing surface—				
Paved surface	$903.30	$3,904.12	----------	$188,380.13
Upkeep of roadside—				
Metal shoulders	----------	----------	----------	----------
Earth shoulders	----------	$ 51.73	----------	$2,717.83
Ditches and drains	$ 6.67	126.22	----------	2,660.34
Bridges and culverts	549.37	115.65	----------	3,097.51
Markers and safety signs	43.93	20.76	$2,918.23	6,218.73
Guard fence	94.33	25.64	----------	2,873.52
Cutting and clearing vegetation	----------	13.50	----------	3,017.95
Cleaning right-of-way	----------	----------	----------	102.37
Snow removal	----------	----------	----------	1,152.09
Total upkeep	$694.30	$353.50	$2,918.23	$21,840.34
Total maintenance and upkeep cost	$1,597.60	$4,257.62	$2,918.23	$210,220.47

TABLE XXXVI—STATEMENT SHOWING COMPARISON OF MILEAGES AND COSTS ON PER MILE BASIS FOR DETOUR ROADS BY TYPES AND UNITS FOR THE CALENDAR YEAR 1928.

Account.	Earth.	Gravel.	Cinders.	Macadam.
Miles maintained	110.33	114.46	8.94	4.52
Maintenance of wearing surface—				
Paved surface	$283.75	$1,000.19	$2,387.66	$3,636.94
Upkeep of roadside—				
Metal shoulders	----------	----------	----------	----------
Earth shoulders	$2.82	$13.63	$ 77.63	$ 22.17
Ditches and drains	5.89	12.22	38.91	28.99
Bridges and culverts	6.32	9.08	73.07	9.41
Markers and safety signs	8.20	14.62	4.66	136.35
Guard fence	1.42	4.98	209.78	33.52
Cutting and clearing vegetation	1.29	23.79	13.26	4.57
Cleaning right-of-way	.04	.19	7.35	2.25
Snow removal	3.62	5.74	5.41	10.58
Total upleep	$29.60	$84.25	$430.07	$247.84
Total maintenance and upkeep	$313.35	$1,084.44	$2,817.73	$3,884.78

TABLE XXXVI—Concluded.

	Miscellaneous.	Shale.	Route marking.
Miles maintained	.71	1.25	407.34
Maintenance of wearing surface—			
Paved surface	$1,272.25	$3,123.30	----------
Upkeep of roadside—			
Metal shoulders	----------	----------	----------
Earth shoulders	----------	$ 41.38	----------
Ditches and drains	$ 9.39	100.98	----------
Bridges and culverts	773.76	92.52	----------
Markers and safety signs	61.87	16.61	$7.16
Guard fence	132.87	20.51	----------
Cutting and clearing vegetation	----------	10.80	----------
Cleaning right-of-way	----------	----------	----------
Snow removal	----------	----------	----------
Total upkeep	$977.89	$282.80	$7.16
Total maintenance and upkeep	$2,250.14	$3,406.10	$7.16

TABLE XXXVII—CONSOLIDATED STATEMENT SHOWING THE COST OF MAINTENANCE AND UPKEEP ON ALL TYPES OF DETOURS, UNPAVED AND TEMPORARY ROUTES FOR THE CALENDAR YEAR 1928.

	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of wearing surface—				
Paved surface	161,064½	$92,103.22	$28,780.77	$15,291.95
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	3,201	$1,632.00	$ 1.65	$245.91
Ditches and drains	2,965½	1,482.86	40.77	274.33
Bridges and culverts	2,229	1,127.89	993.09	171.46
Markers and safety signs	6,635	3,285.06	394.43	373.25
Guard fence	1,345	654.17	1,706.61	55.64
Cutting and clearing vegetation	4,411	1,986.26		140.47
Cleaning right-of-way	120½	57.44		2.01
Snow removal	1,196	595.56		120.15
Total upkeep	22,103	$10,821.24	$3,136.55	$1,383.22
Total maintenance and upkeep cost	183,167½	$102,924.46	$31,917.32	$16,675.17

TABLE XXXVII—Concluded.

	Total direct cost.	Indirect expense.*	Total cost.
Maintenance of wearing surface—			
Paved surface	$136,175.94	$52,204.19	$188,380.13
Upkeep of roadside—			
Metal shoulders			
Earth shoulders	$1,879.56	$ 838.27	$2,717.83
Ditches and drains	1,797.96	862.38	2,660.34
Bridges and culverts	2,292.44	805.07	3,097.51
Markers and safety signs	4,052.74	2,165.99	6,218.73
Guard fence	2,416.42	457.10	2,873.52
Cutting and clearing vegetation	2,126.73	891.22	3,017.95
Cleaning right-of-way	59.45	42.92	102.37
Snow removal	715.71	436.38	1,152.09
Total upkeep	$15,341.01	$6,499.33	$21,840.34
Total maintenance and upkeep cost	$151,516.95	$58,703.52	$210,220.47

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* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE XXXVIII—STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF BRIDGES OVER 100-FOOT SPAN (LOCATED IN THE VARIOUS DISTRICTS) FOR THE CALENDAR YEAR 1928.

District.	Number of bridges.	Labor hours.	Direct labor.	Direct material.	Direct expense.
No. 1	58	1,237½	$ 676.31	$ 35.07	$ 195.15
No. 2	26	177	94.04	99.95	19.16
No. 3	27	765	396.80	111.42	35.69
No. 4	33	5,910½	2,805.74	1,477.38	973.96
No. 5	26	1,524	663.44	367.63	65.66
No. 6	23	864	436.34	444.00	116.53
No. 7	10	7,357½	5,342.54	17,937.28	807.20
No. 8	21	11,855	5,238.59	1,979.94	1,260.52
No. 9	24	5,000	2,510.26	858.72	460.89
Total	248	34,690½	$18,164.06	$23,311.39	$3,934.76

TABLE XXXVIII—Concluded.

District.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per bridge.
No. 1	$ 906.53	$ 451.36	$ 1,357.89	$ 23.41
No. 2	213.15	59.19	272.34	10.48
No. 3	543.91	253.56	797.47	29.53
No. 4	5,257.08	1,434.87	6,691.95	202.79
No. 5	1,096.73	423.27	1,520.00	58.46
No. 6	996.87	271.99	1,268.86	55.16
No. 7	24,087.02	1,337.99	25,425.01	2,542.50
No. 8	8,479.05	2,439.66	10,918.71	519.93
No. 9	3,829.87	1,442.00	5,271.87	219.66
Total	$45,410.21	$8,113.89	$53,524.10	$215.83

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XXXIX—STATEMENT SHOWING COST OF ADDITIONS AND BETTERMENTS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

Class of work.	District No. 1.	District No. 2.	District No. 3.	District No. 4.	District No. 5.
Stop signs in cities	$ 383.23		$ 244.20		$ 307.74
Stop signs outside cities					
Marking federal routes	7,325.69	$ 4,485.64	8,402.38	$ 4,186.53	2,716.64
New pavement	3,578.68	11,882.74	8,213.55	3,331.56	
Widening pavement				80.01	358.85
Widening curves	12.55	1,898.58			
Pouring cracks in base of brick pavement				80.85	
Filling expansion joints	3,105.05	3,398.59	5,259.26	2,487.10	
New curb and gutter	69.00		271.87	2,223.98	4,609.89
New ditch weirs					
New baffle walls			1,554.13	1,489.85	7,209.63
New slope walls		865.37		76.75	
New spillways					
New side-walk	178.43				
Widening cuts				19,571.61	
New fills	175.00				
Cribbing fills					
New grading				174.91	
New earth shoulders	541.41			692.53	
Seeding earth shoulders	1,451.61	2,017.07	245.85	1,826.00	524.90
New bituminous macadam shoulders			8,660.52		
Shoulder protection					339.44
Bridges and culverts	6,353.17	63.67	332.96	3,056.43	6,457.85
Ditches and drains	10,969.03	3.91	3,403.54	5,164.27	270.84
Markers and safety signs	5,344.11	1,175.45	6,008.88	4,043.38	1,566.32
New guard fence	6,808.54	1,357.27	3,883.34	1,062.17	
R. O. W. markers			902.38	477.34	549.51
Clearing right-of-way					
Changing stream channels				2,080.03	
Total cost including overhead	$46,295.50	$27,148.29	$47,382.86	$52,105.30	$24,911.61

TABLE XXXIX—Concluded.

Class of work.	District No. 6.	District No. 7.	District No. 8.	District No. 9.	Total.
Stop signs in cities	$ 7.58			$ 62.85	$ 1,005.60
Stop signs outside cities	69.90				69.90
Marking federal routes	2,248.23	$1,905.87	$ 770.74	1,251.49	33,293.21
New pavement	6,652.66		5,081.27		38,740.46
Widening pavement			1,175.15		1,614.01
Widening curves			129.04	687.10	2,727.27
Pouring cracks in base of brick pavement					80.85
Filling expansion joints	2,321.90	87.39		2,977.75	19,637.04
New curb and gutter					7,174.74
New ditch weirs				1,906.47	1,906.47
New baffle walls		2,007.81		1,473.25	13,734.67
New slope walls	137.49				1,079.61
New spillways	2,803.24				2,803.24
New side-walk					178.43
Widening cuts					19,571.61
New fills					175.00
Cribbing fills				2,103.20	2,103.20
New grading					174.91
New earth shoulders					1,233.94
Seeding earth shoulders	621.72	106.60	520.96	62.67	7,377.38
New bituminous macadam shoulders					8,660.52
Shoulder protection					339.44
Bridges and culverts	7,631.59		1,418.41	1.72	25,315.80
Ditches and drains	5,403.33		163.76		25,378.68
Markers and safety signs	2,408.04	234.62		2,719.83	23,500.63
New guard fence	1,483.90			144.49	14,739.71
R. O. W. markers	4,039.26				5,968.49
Clearing right-of-way	81.82				81.82
Changing stream channels					2,080.03
Total cost including overhead	$35,910.66	$4,342.29	$9,259.33	$13,390.82	$260,746.66

TABLE XL—STATEMENT SHOWING COST OF SNOW REMOVAL FOR THE NORTHERN, CENTRAL AND SOUTHERN ZONES FOR THE CALENDAR YEAR 1928.

District number.	Weighted average mileage.	Labor hours.	Direct labor.	Direct expense.
No. 1	752.87	38,363	$21,938.83	$9,705.36
No. 2	492.09	12,968½	6,671.68	2,661.53
No. 3	554.75	23,088½	11,319.94	9,169.26
No. 4	455.61	27,237	12,563.61	9,951.61
Total for Northern District	2,255.32	101,657	$52,494.06	$31,487.76
No. 5	265.68	10,535	$4,899.62	$3,369.74
No. 6	155.35	8,800½	4,240.33	2,782.63
Total for Central District	421.03	19,335½	$9,139.95	$6,152.37
No. 7	41.45	552	$ 233.05	$ 57.93
No. 8	160.77	3,856½	1,739.17	630.60
No. 9	35.68	334½	162.32	111.15
Total for Southern District	237.90	4,743	$2,134.54	$799.68
Total for entire State	2,914.25	125,735½	$63,768.55	$38,439.81

TABLE XL—Concluded.

District number.	Direct total cost.	Overhead expense.	Total cost.	Average cost per mile.
No. 1	$31,644.19	$14,381.03	$46,025.22	$61.13
No. 2	9,333.21	4,539.86	13,873.07	28.19
No. 3	20,489.20	15,383.13	35,872.33	64.66
No. 4	22,515.22	8,590.95	31,106.17	68.27
Total for Northern District	$83,981.82	$42,894.97	$126,876.79	$56.26
No. 5	$8,269.36	$6,182.70	$14,452.06	$54.40
No. 6	7,022.96	3,965.68	10,988.64	70.74
Total for Central District	$15,292.32	$10,148.38	$25,440.70	$60.42
No. 7	$ 290.98	$ 163.33	$ 454.31	$10.96
No. 8	2,369.77	1,021.16	3,390.93	21.09
No. 9	273.47	146.19	419.66	11.76
Total for Southern District	$2,934.22	$1,330.68	$4,264.90	$17.92
Total for entire State	$102,208.36	$54,374.03	$156,582.39	$53.73

TABLE XLI—STATEMENT SHOWING COST OF MARKING ROUTES THROUGH CITIES IN ALL DISTRICTS FOR THE CALENDAR YEAR 1928.

District.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.
No. 1	22,994	$12,820.36	$312.84	$740.20	$13,873.40	$8,389.27	$22,262.67
No. 2	773	421.46	1.20	12.14	434.80	253.26	688.06
No. 3	1,521	743.80	102.60	58.99	905.39	792.71	1,698.10
No. 4	2,459	1,123.28	38.79	85.54	1,247.61	633.39	1,881.00
No. 5	2,034	904.70	62.97	----------	967.67	766.83	1,734.50
No. 6	668	328.45	----------	----------	328.45	262.57	591.02
No. 7	221	107.60	----------	----------	107.60	43.66	151.26
No. 8	1,674½	869.23	12.57	----------	881.80	352.56	1,234.36
No. 9	1,353	682.20	----------	20.00	702.20	504.51	1,206.71
Total	33,697½	$18,001.08	$530.97	$916.87	$19,448.92	$11,998.76	$31,447.68

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE XLII—ILLINOIS STATE HIGHWAY POLICE ANNUAL REPORT—1928.

Offense.	Warnings.	Arrests.
Murder	0	3
Manslaughter	0	5
Attempt to murder	0	3
Bank robbers	0	1
Assault with deadly weapon	0	6
Assault and battery	0	2
Highway robbery with a gun	0	6
Holdup with a gun	0	2
Robbery	0	7
Holdup	0	3
Slugging	0	2
Burglary	0	45
Forgery	0	16
Confidence game	0	5
Passing worthless checks	0	6
Kidnapping	0	2
Conspiracy	0	7
Escaped convicts captured	0	8
Assault with intent to murder	0	1
White slave act	0	6
Jail breaking	0	1
Assisting in jail breaking	0	4
Parole violator captured	0	4
Carrying concealed weapons	0	8
Wife and child abandonment	0	3
Insane patients captured	0	17
Deserters from the United States Army	0	1
Deserters from the United States Navy	0	3
Pickpocket	0	1
Impersonating an officer	0	3
Resisting an officer	0	1
Runaway boys apprehended	0	35
Runaway girls apprehended	0	8
Extortion by threats	0	3
False imprisonment	0	2
Obstructing the highways	0	12
Breaking glass on the highway	0	2
Vagrancy	0	5
Interrupting funeral procession	0	2
Chicken thieves	0	2
Leaving scene of an accident (Sec. 41a of M. V. L.)	0	26
Section 39, M. V. L. (car theft)	0	116
Grand larceny	0	129
Dyer Act	0	35
Petty larceny	0	22
Intoxicated on highways	0	104
Intoxicated drivers of cars (Sec. 41 M. V. L.)	0	273
Trucks weighed	14,702	0
Trucks overweight (arrests)	0	771
Trucks overwidth	0	3
Speeding trucks	287	241
Speeding busses	43	38
Speeding pleasure cars	23,201	875
Reckless drivers	402	399
Racing on the highway (Sec. 25, M. V. L.)	0	18
Right-of-ways, boulevard stops (Sec. 33, M. V. L.)	1,676	297
Lights (Sec. 16, M. V. L.)	34,967	159
Licenses (Sec. 14, M. V. L.)	5,909	171
Fictitious licenses	0	334
Chauffeur licenses (Sec. 28, M. V. L.)	90	29
Employing unlicensed chauffeur	0	98
Altering license plates (Sec. 15, M. V. L.)	0	7
Altering motor numbers, etc. (Sec. 34, M. V. L.)	0	2
Bad tires (Sec. 4, M. V. L.)	320	49
Mirrors (none), (Sec. 21a, M. V. L.)	205	29
Governors (none), (Sec. 24a, M. V. L.)	0	20
Bad brakes, cut outs (Sec. 21, M. V. L.)	52	38
Blocking fire department	0	1
No motor numbers	0	2
Walking on wrong side of pavement	522	2
Parking on pavement	726	19
Passenger car fees (Sec. 8, M. V. L.)	0	144
Truck fees (Sec. 9, M. V. L.)	0	127
Section 4 and 7 (Tractor, Traction Engines)	0	5
Disorderly conduct (Sec. 56, M. V. L.)	0	203
Section 17 (dealer's plates)	0	9
Section 20 (non-resident license fees)	0	1
Misdemeanor	0	2
Possessing stolen property	0	21

TABLE XLII—Concluded.

Offense.	Warnings.	Arrests.
Disposing of stolen property	0	2
Disposing of mortgaged property	0	4
Transporting mortgaged property	0	3
Destroying personal property	0	3
Destroying Government property	0	2
Age limit (Sec. 31, M. V. L.)	0	2
Section 42—Damages for injuries	0	5
Using motor vehicle without owner's consent (Sec. 32, M. V. L.)	0	2
Special engine numbers (Sec. 35, M. V. L.)	0	8
Neglect to warn of approach (Sec. 40, M. V. L.)	0	1
License transfers (Sec. 19, M. V. L.)	0	1
Dumping garbage on highway (Sec. 143, Road and Bridge Law)	0	9
Destroying or defacing guide boards (Sec. 142, Chap. 38, Road and Bridge Law)	0	4
Assistance rendered to the public		1,427
Funeral corteges protected on public highways		832
Stolen cars recovered		345
Value of stolen property recovered		$346,643

TABLE XLIII—TRIAL BALANCE COVERING TRANSACTIONS OF THE BUREAU OF MAINTENANCE FOR THE CALENDAR YEAR 1928.

DEBITS.

Maintenance of Surfaced Roads—		
District No. 1 Patrol Costs	$505,840.85	
District No. 2 Patrol Costs	180,837.92	
District No. 3 Patrol Costs	232,674.65	
District No. 4 Patrol Costs	206,712.76	
District No. 5 Patrol Costs	235,476.84	
District No. 6 Patrol Costs	175,720.13	
District No. 7 Patrol Costs	168,354.81	
District No. 8 Patrol Costs	218,935.76	
District No. 9 Patrol Costs	164,238.58	
		$2,088,792.30
Maintenance of Detours—		
District No. 1 Patrol Costs	$25,782.18	
District No. 2 Patrol Costs	22,418.02	
District No. 3 Patrol Costs	16,062.43	
District No. 4 Patrol Costs	46,153.38	
District No. 5 Patrol Costs	2,064.57	
District No. 6 Patrol Costs	21,270.16	
District No. 7 Patrol Costs	16,809.68	
District No. 8 Patrol Costs	18,191.13	
District No. 9 Patrol Costs	41,468.92	
		$210,220.47
Construction of Additions and Betterments—		
District No. 1 Section Costs	$46,295.50	
District No. 2 Section Costs	27,148.29	
District No. 3 Section Costs	47,382.86	
District No. 4 Section Costs	52,105.30	
District No. 5 Section Costs	24,911.61	
District No. 6 Section Costs	35,910.66	
District No. 7 Section Costs	4,342.29	
District No. 8 Section Costs	9,259.33	
District No. 9 Section Costs	13,390.82	
		$260,746.66
Police Officers Costs		452,443.11
Police Officers Equipment		25,657.96
Maintenance, Machinery and Equipment		119,458.03
Sign and Post Shop Inventory		12,150.92
Maintenance Cash Refunds		71,911.42
Due from Counties for State Aid Maintenance		11,972.61
Total Debits		$3,253,353.48

CREDITS.

Highway Maintenance Road Fund Fifty-fifth General Assembly	$2,771,710.63
Highway Construction Road Fund Fifty-fifth General Assembly	93,528.32
Highway Construction Bond Fund Fifty-fifth General Assembly	120,573.30
County State Aid Maintenance Appropriations	41,361.35
Allowance for Depreciation	103,922.13
Bureau of Machinery	95,719.36
Bureau of Construction (Day Labor)	5,274.31
Bureau of Materials	21,264.08
Total Credits	$3,253,353.48

TABLE XLIV—SUMMARY OF YEARLY EXPENDITURES—1913 TO 1928 INCLUSIVE; ROAD FUND, $60,000,000.00 AND $100,000,000.00 BOND FUNDS AND GENERAL REVENUE FUND APPROPRIATIONS.

Year.	Administration and engineering.	State Aid construction.	State Aid reconstruction.	Federal Aid and S. B. I. construction.	Surfacing of gaps and detours.
1913					
1914		$364,202.39			
1915	$ 22,128.34	630,612.30			
1916	3,920.88	656,641.05			
1917	113,318.90	992,754.54			
1918	21,896.36	334,224.06		$ 190,578.78	
1919	568,099.29	441,060.76		3,882,213.47	
1920	1,054,178.76	209,286.41		10,109,977.55	
Sub-total	$1,783,542.53	$3,628,781.51		$14,182,769.80	
1921	$1,230,848.91	$115,104.51		$13,163,408.43	
1922	1,734,496.93	32,768.68		17,523,817.93	
1923	2,285,735.31	25,278.46		25,556,276.09	
1924	2,821,100.23		$ 619.92	33,360,724.25	$16,551.90
1925	2,558,791.64		263.24	28,201,616.10	58,450.82
1926	1,983,703.68		20,021.35	13,318,292.35	42,895.71
1927	2,142,176.97		491,897.15	18,176,611.12	34,200.04
1928	2,699,592.47		122,725.48	39,430,996.56	20,568.76
Sub-total	$17,456,446.14	$173,151.65	$635,527.14	$188,731,742.83	$172,667.23
Total	$19,239,988.67	$3,801,933.16	$635,527.14	$202,914,512.63	$172,667.23

TABLE XLIV—Continued.

Year.	Additions and betterments.	Maintenance.	Refunds to counties.	Refund on Georgetown Bridge.	Fay Hunsley relief.
1913					
1914					
1915		$ 14,657.73			
1916		17,125.25			
1917		34,307.21			
1918		37,303.98			
1919		84,614.37			
1920		208,802.55			
Sub-total		$396,811.09			
1921		$ 358,658.85	$ 727,273.18		$4,000.00
1922		640,503.01	2,436,005.43		
1923		1,110,034.41	2,016,520.20		
1924	$ 41,585.46	2,044,860.69	1,176,893.14		
1925	113,276.32	1,834,637.74	602,050.80		
1926	87,704.95	2,264,770.58	499,202.93		
1927	157,607.11	2,721,444.45	368,187.25	$19,500.00	
1928	248,862.50	2,859,756.51	1,540,435.85		
Sub-total	$649,036.34	$13,834,666.24	$9,366,568.78	$19,500.00	$4,000.00
Total	$649,036.34	$14,231,477.33	$9,366,568.78	$19,500.00	$4,000.00

(See next page.)

TABLE XLIV—Continued.

Year.	Interest and principal on $60,000,000.00 and $100,000,000.00 bonds.	Construction through munici-palities.	Refunds to munici-palities.	Fair Grounds to Biological Laboratory Road.	Banner to Copperas Creek Road.
1913				$5,348.67	
1914				2,149.66	
1915					
1916					
1917					
1918					
1919					
1920					
Sub-total				$7,498.33	
1921					
1922	$ 96,120.00				
1923	661,340.00				
1924	1,388,813.35				
1925	2,687,303.72	$ 19,592.59			
1926	5,510,843.18	538,374.33			$ 4,863.73
1927	5,606,009.75	325,859.68	$210,864.06		15,544.01
1928	6,149,016.11	13,300.39	89,795.19		20,684.84
Sub-total	$22,099,446.11	$897,126.99	$300,659.25		$41,092.58
Total	$22,099,446.11	$897,126.99	$300,659.25	$7,498.33	$41,092.58

TABLE XLIV—Concluded.

Year.	Soldiers' Widows' Home Road.	Bridge at Pekin.	To connect roads with bond routes.	Construction of drives and walks.	Total.
1913					$ 5,348.67
1914					366,352.05
1915					667,398.37
1916					677,687.18
1917					1,140,380.65
1918					584,003.18
1919					4,975,987.89
1920					11,582,245.27
Sub-total					$19,999,403.26
1921					$15,599,293.88
1922					22,463,711.98
1923					31,655,184.47
1924					40,851,148.94
1925					36,075,982.97
1926					24,270,672.79
1927	$19,015.43				30,288,917.02
1928	4,867.35	$91,918.11	$108,341.19	$70,720.31	53,471,581.62
Sub-total	$23,882.78	$91,918.11	$108,341.19	$70,720.31	$254,676,493.67
Total	$23,882.78	$91,918.11	$108,341.19	$70,720.31	$274,675,896.93

TABLE XLV—STATEMENT SHOWING BALANCES, RECEIPTS AND EXPENDITURES FOR ALL FUNDS COMBINED FOR THE CALENDAR YEAR 1928.

Month.	Balance at beginning of month.	Receipts during month.	Per cent of total receipts.	Total.
January	$ 2,439,599.64	$ 2,166,994.99	3.94	$ 4,606,594.63
February	3,627,671.62	4,217,182.04	7.67	7,844,853.66
March	6,961,482.32	3,523,097.47	6.41	10,484,579.79
April	7,999,526.01	1,914,814.20	3.48	9,914,340.21
May	8,472,187.94	8,411,939.10	15.31	16,884,127.04
June	10,106,896.16	1,369,574.42	2.49	11,476,470.58
July	6,232,661.01	13,106,679.88	23.85	19,339,340.89
August	12,906,016.45	486,657.99	.89	13,392,674.44
September	6,235,661.67	10,754,719.07	19.57	16,990,380.74
October	8,778,542.18	294,206.37	.54	9,072,748.55
November	2,591,124.89	8,080,131.25	14.70	10,671,256.14
December	6,349,421.49	569,173.45	1.15	6,918,594.94
Total	$2,439,599.64	$54,895,170.23	100.00	$57,334,769.87

TABLE XLV—Concluded.

Month.	Expenditures during month.	Per cent of total expenditures.	Balance at end of month.
January	$ 978,923.01	1.83	$ 3,627,671.62
February	883,371.34	1.65	6,961,482.32
March	2,485,053.78	4.65	7,999,526.01
April	1,442,152.27	2.70	8,472,187.94
May	6,777,230.88	12.68	10,106,896.16
June	5,243,809.57	9.81	6,232,661.01
July	6,433,324.44	12.03	12,906,016.45
August	7,157,012.77	13.38	6,235,661.67
September	8,211,838.56	15.36	8,778,542.18
October	6,481,623.66	12.12	2,591,124.89
November	4,321,834.65	8.08	6,349,421.49
December	3,055,406.69	5.71	3,863,188.25
Total	$53,471,581.62	100.00	$3,863,188.25

TABLE XLVI—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF THE $60,000,000 AND ON $77,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1928.

Year in which principal is to be retired and interest paid.	Principal of $60,000,000 bonds to be retired each year.	Principal of $100,000,000 bonds to be retired each year.	Total principal both bond issues to be retired each year.	Interest on $60,000,000 bonds to be paid each year.	Interest on $100,000,000 bonds to be paid each year.	Total interest on both bond issues to be paid each year.	Total principal and interest both bond issues to be paid each year.
1929	$2,000,000.00		$2,000,000.00	$2,160,000.00	$3,080,000.00	$5,240,000.00	$7,240,000.00
1930	2,000,000.00		2,000,000.00	2,080,000.00	3,080,000.00	5,160,000.00	7,160,000.00
1931	2,000,000.00		2,000,000.00	2,000,000.00	3,080,000.00	5,080,000.00	7,080,000.00
1932	2,000,000.00	$ 500,000.00	2,500,000.00	1,920,000.00	3,070,000.00	4,990,000.00	7,490,000.00
1933	2,000,000.00	500,000.00	2,500,000.00	1,840,000.00	3,050,000.00	4,890,000.00	7,390,000.00
1934	2,000,000.00	500,000.00	2,500,000.00	1,760,000.00	3,030,000.00	4,790,000.00	7,290,000.00
1935	3,000,000.00	500,000.00	3,500,000.00	1,680,000.00	3,010,000.00	4,690,000.00	8,190,000.00
1936	3,000,000.00	500,000.00	3,500,000.00	1,560,000.00	2,990,000.00	4,550,000.00	8,050,000.00
1937	3,000,000.00	500,000.00	3,500,000.00	1,440,000.00	2,970,000.00	4,410,000.00	7,910,000.00
1938	4,000,000.00	500,000.00	4,500,000.00	1,320,000.00	2,950,000.00	4,270,000.00	8,770,000.00
1939	4,000,000.00	500,000.00	4,500,000.00	1,160,000.00	2,930,000.00	4,090,000.00	8,590,000.00
1940	5,000,000.00		5,000,000.00	1,000,000.00	2,920,000.00	3,920,000.00	8,920,000.00
1941	5,000,000.00		5,000,000.00	800,000.00	2,920,000.00	3,720,000.00	8,720,000.00
1942	5,000,000.00		5,000,000.00	600,000.00	2,920,000.00	3,520,000.00	8,520,000.00
1943	5,000,000.00		5,000,000.00	400,000.00	2,920,000.00	3,320,000.00	8,320,000.00
1944	5,000,000.00		5,000,000.00	200,000.00	2,920,000.00	3,120,000.00	8,120,000.00
1945		4,500,000.00	4,500,000.00		2,830,000.00	2,830,000.00	7,330,000.00
1946		4,500,000.00	4,500,000.00		2,650,000.00	2,650,000.00	7,150,000.00
1947		4,500,000.00	4,500,000.00		2,470,000.00	2,470,000.00	6,970,000.00
1948		4,500,000.00	4,500,000.00		2,290,000.00	2,290,000.00	6,790,000.00
1949		5,000,000.00	5,000,000.00		2,100,000.00	2,100,000.00	7,100,000.00
1950		5,000,000.00	5,000,000.00		1,900,000.00	1,900,000.00	6,900,000.00
1951		5,000,000.00	5,000,000.00		1,700,000.00	1,700,000.00	6,700,000.00
1952		5,000,000.00	5,000,000.00		1,500,000.00	1,500,000.00	6,500,000.00
1953		5,500,000.00	5,500,000.00		1,290,000.00	1,290,000.00	6,790,000.00
1954		5,500,000.00	5,500,000.00		1,070,000.00	1,070,000.00	6,570,000.00
1955		5,500,000.00	5,500,000.00		850,000.00	850,000.00	6,350,000.00
1956		5,500,000.00	5,500,000.00		630,000.00	630,000.00	6,130,000.00
1957		6,500,000.00	6,500,000.00		390,000.00	390,000.00	6,890,000.00
1958		6,500,000.00	6,500,000.00		130,000.00	130,000.00	6,630,000.00
Total	$54,000,000.00	$77,000,000.00	$131,000,000.00	$21,920,000.00	$69,640,000.00	$91,560,000.00	$222,560,000.00

TABLE XLVII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS, SHOWING THE AMOUNT OF PRINCIPAL DUE AT EACH RETIREMENT PERIOD ON THE ENTIRE $60,000,000 BOND ISSUE PLUS $77,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1928.

Year in which principal is to be retired.	Principal $60,000,000 bonds to be retired March 1st each year.	Principal $100,000,000 bonds to be retired March 1st each year.	Total principal both bond issues to be retired March 1st.	Principal $60,000,000 bonds to be retired May 1st each year.	Principal $100,000,000 bonds to be retired May 1st each year.	Total principal both bond issues to be retired May 1st.	Total $60,000,000 bond principal to be retired each year.	Total $100,000,000 bond principal to be retired each year.	Total principal both bond issues to be retired each year.
1929				$2,000,000.00		$2,000,000.00	$2,000,000.00		$2,000,000.00
1930				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1931				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1932				2,000,000.00	$ 500,000.00	2,500,000.00	2,000,000.00	$ 500,000.00	2,500,000.00
1933				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1934				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1935	$1,000,000.00		$1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1936	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1937	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1938	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1939	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1940	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1941	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1942	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1943	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1944	5,000,000.00		5,000,000.00				5,000,000.00		5,000,000.00
1945		$2,000,000.00	2,000,000.00		2,500,000.00	2,500,000.00		4,500,000.00	4,500,000.00
1946		2,000,000.00	2,000,000.00		2,500,000.00	2,500,000.00		4,500,000.00	4,500,000.00
1947		2,000,000.00	2,000,000.00		2,500,000.00	2,500,000.00		4,500,000.00	4,500,000.00
1948		2,000,000.00	2,000,000.00		2,500,000.00	2,500,000.00		4,500,000.00	4,500,000.00
1949		2,500,000.00	2,500,000.00		2,500,000.00	2,500,000.00		5,000,000.00	5,000,000.00
1950		2,500,000.00	2,500,000.00		2,500,000.00	2,500,000.00		5,000,000.00	5,000,000.00
1951		2,500,000.00	2,500,000.00		2,500,000.00	2,500,000.00		5,000,000.00	5,000,000.00
1952		2,500,000.00	2,500,000.00		2,500,000.00	2,500,000.00		5,000,000.00	5,000,000.00
1953		2,500,000.00	2,500,000.00		3,000,000.00	3,000,000.00		5,500,000.00	5,500,000.00
1954		2,500,000.00	2,500,000.00		3,000,000.00	3,000,000.00		5,500,000.00	5,500,000.00
1955		2,000,000.00	2,000,000.00		3,500,000.00	3,500,000.00		5,500,000.00	5,500,000.00
1956		2,000,000.00	2,000,000.00		3,500,000.00	3,500,000.00		5,500,000.00	5,500,000.00
1957		3,000,000.00	3,000,000.00		3,500,000.00	3,500,000.00		6,500,000.00	6,500,000.00
1958		3,000,000.00	3,000,000.00		3,500,000.00	3,500,000.00		6,500,000.00	6,500,000.00
Total	$30,000,000.00	$33,000,000.00	$63,000,000.00	$24,000,000.00	$44,000,000.00	$68,000,000.00	$54,000,000.00	$77,000,000.00	$131,000,000.00

NOTE—$2,000,000 of the $60,000,000 bond issue was retired during each of the years 1926, 1927 and 1928.

TABLE XLVIII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF INTEREST DUE AT EACH INTEREST PAYING PERIOD ON THE ENTIRE $60,000,000 BOND ISSUE PLUS $77,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1928

Year in which interest is to be paid.	Interest on $60,000,000 bonds to be paid March 1st each year.	Interest on $100,000,000 bonds to be paid March 1st each year.	Total interest on both bond issues to be paid March 1st each year.	Interest on $60,000,000 bonds to be paid May 1st each year.	Interest on $100,000,000 bonds to be paid May 1st each year.	Total interest on both bond issues to be paid May 1st each year.	Interest on $100,000,000 bonds to be paid Sept. 1st each year.	Interest on $100,000,000 bonds to be paid Nov. 1st each year.	Total interest on $60,000,000 bond issue to be paid each year.	Total interest on $100,000,000 bond issue to be paid each year.	Total interest on both bond issues to be paid each year.
1929	$1,200,000.00	$660,000.00	$1,860,000.00	$960,000.00	$880,000.00	$1,840,000.00	$660,000.00	$880,000.00	$2,160,000.00	$3,080,000.00	$5,240,000.00
1930	1,200,000.00	660,000.00	1,860,000.00	880,000.00	880,000.00	1,760,000.00	660,000.00	880,000.00	2,080,000.00	3,080,000.00	5,160,000.00
1931	1,200,000.00	660,000.00	1,860,000.00	800,000.00	880,000.00	1,680,000.00	660,000.00	880,000.00	2,000,000.00	3,080,000.00	5,080,000.00
1932	1,200,000.00	660,000.00	1,860,000.00	720,000.00	880,000.00	1,600,000.00	660,000.00	870,000.00	1,920,000.00	3,070,000.00	4,990,000.00
1933	1,200,000.00	660,000.00	1,860,000.00	640,000.00	870,000.00	1,510,000.00	660,000.00	860,000.00	1,840,000.00	3,050,000.00	4,890,000.00
1934	1,200,000.00	660,000.00	1,860,000.00	560,000.00	860,000.00	1,420,000.00	660,000.00	850,000.00	1,760,000.00	3,030,000.00	4,790,000.00
1935	1,200,000.00	660,000.00	1,860,000.00	480,000.00	850,000.00	1,330,000.00	660,000.00	840,000.00	1,680,000.00	3,010,000.00	4,690,000.00
1936	1,160,000.00	660,000.00	1,820,000.00	400,000.00	840,000.00	1,240,000.00	660,000.00	830,000.00	1,560,000.00	2,990,000.00	4,550,000.00
1937	1,120,000.00	660,000.00	1,780,000.00	320,000.00	830,000.00	1,150,000.00	660,000.00	820,000.00	1,440,000.00	2,970,000.00	4,410,000.00
1938	1,080,000.00	660,000.00	1,740,000.00	240,000.00	820,000.00	1,060,000.00	660,000.00	810,000.00	1,320,000.00	2,950,000.00	4,270,000.00
1939	960,000.00	660,000.00	1,620,000.00	200,000.00	810,000.00	1,010,000.00	660,000.00	800,000.00	1,160,000.00	2,930,000.00	4,090,000.00
1940	840,000.00	660,000.00	1,500,000.00	160,000.00	800,000.00	960,000.00	660,000.00	800,000.00	1,000,000.00	2,920,000.00	3,920,000.00
1941	680,000.00	660,000.00	1,340,000.00	120,000.00	800,000.00	920,000.00	660,000.00	800,000.00	800,000.00	2,920,000.00	3,720,000.00
1942	520,000.00	660,000.00	1,180,000.00	80,000.00	800,000.00	880,000.00	660,000.00	800,000.00	600,000.00	2,920,000.00	3,520,000.00
1943	360,000.00	660,000.00	1,020,000.00	40,000.00	800,000.00	840,000.00	660,000.00	800,000.00	400,000.00	2,920,000.00	3,320,000.00
1944	200,000.00	660,000.00	860,000.00	----------	800,000.00	800,000.00	660,000.00	800,000.00	200,000.00	2,920,000.00	3,120,000.00
1945	----------	660,000.00	660,000.00	----------	800,000.00	800,000.00	620,000.00	750,000.00	----------	2,830,000.00	2,830,000.00
1946	----------	620,000.00	620,000.00	----------	750,000.00	750,000.00	580,000.00	700,000.00	----------	2,650,000.00	2,650,000.00
1947	----------	580,000.00	580,000.00	----------	700,000.00	700,000.00	540,000.00	650,000.00	----------	2,470,000.00	2,470,000.00
1948	----------	540,000.00	540,000.00	----------	650,000.00	650,000.00	500,000.00	600,000.00	----------	2,290,000.00	2,290,000.00
1949	----------	500,000.00	500,000.00	----------	600,000.00	600,000.00	450,000.00	550,000.00	----------	2,100,000.00	2,100,000.00
1950	----------	450,000.00	450,000.00	----------	550,000.00	550,000.00	400,000.00	500,000.00	----------	1,900,000.00	1,900,000.00
1951	----------	400,000.00	400,000.00	----------	500,000.00	500,000.00	350,000.00	450,000.00	----------	1,700,000.00	1,700,000.00
1952	----------	350,000.00	350,000.00	----------	450,000.00	450,000.00	300,000.00	400,000.00	----------	1,500,000.00	1,500,000.00
1953	----------	300,000.00	300,000.00	----------	400,000.00	400,000.00	250,000.00	340,000.00	----------	1,290,000.00	1,290,000.00
1954	----------	250,000.00	250,000.00	----------	340,000.00	340,000.00	200,000.00	280,000.00	----------	1,070,000.00	1,070,000.00
1955	----------	200,000.00	200,000.00	----------	280,000.00	280,000.00	160,000.00	210,000.00	----------	850,000.00	850,000.00
1956	----------	160,000.00	160,000.00	----------	210,000.00	210,000.00	120,000.00	140,000.00	----------	630,000.00	630,000.00
1957	----------	120,000.00	120,000.00	----------	140,000.00	140,000.00	60,000.00	70,000.00	----------	390,000.00	390,000.00
1958	----------	60,000.00	60,000.00	----------	70,000.00	70,000.00	----------	----------	----------	130,000.00	130,000.00
Total	$15,320,000.00	$15,750,000.00	$31,070,000.00	$6,600,000.00	$19,840,000.00	$26,440,000.00	$15,090,000.00	$18,960,000.00	$21,920,000.00	$69,640,000.00	$91,560,000.00

TABLE XLIX—STATEMENT OF FEDERAL AID FUNDS ALLOTTED BY THE UNITED STATES GOVERNMENT TO ILLINOIS 1917 TO 1930 INCLUSIVE.

	Amount.
Fiscal Year Ending June 30, 1917	$ 220,926.23
Fiscal Year Ending June 30, 1918	441,852.46
Fiscal Year Ending June 30, 1919	2,185,550.65
Fiscal Year Ending June 30, 1919	658,323.48
Fiscal Year Ending June 30, 1920	874,220.26
Fiscal Year Ending June 30, 1920	3,278,325.98
Fiscal Year Ending June 30, 1921	1,091,266.98
Fiscal Year Ending June 30, 1921	3,273,800.93
Fiscal Year Ending June 30, 1922	3,246,281.07
Fiscal Year Ending June 30, 1923	2,164,187.38
Fiscal Year Ending June 30, 1923—Reapportioned	28,611.00
Fiscal Year Ending June 30, 1924	2,797,888.59
Fiscal Year Ending June 30, 1925	3,203,867.99
Fiscal Year Ending June 30, 1926	3,191,479.00
Fiscal Year Ending June 30, 1927	3,175,616.00
Fiscal Year Ending June 30, 1928	3,154,429.00
Fiscal Year Ending June 30, 1929	3,135,225.00
Fiscal Year Ending June 30, 1930	3,118,949.00
	$39,240,801.00

TABLE L—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Year of collection.	Number of vehicles.	Fees collected.	Average license fee per motor vehicle.
1911	38,269	$ 105,344.28	$ 2.75
1912	68,012	375,716.22	5.52
1913	94,646	507,134.77	5.36
1914	131,140	703,403.70	5.36
1915	180,832	924,905.74	5.11
1916	248,429	1,242,509.85	5.00
1917	340,252	1,587,772.69	4.67
1918	389,761	2,762,567.53	7.09
1919	478,438	3,262,176.57	6.82
1920	568,759	5,893,586.02	10.36
1921	670,389	6,776,781.17	9.94
1922	786,188	7,861,211.21	10.01
1923	973,608	9,630,367.77	9.94
1924	1,128,053	11,513,957.05	8.68
1925	1,267,734	12,936,882.13	10.20
1926	1,375,191	14,047,207.86	10.21
1927	1,443,579	14,839,593.29	10.28
1928	1,508,907	15,521,529.88	10.29
Total 1911 to 1928	11,692,187	$110,492,647.73	$9.44

NOTE—This statement represents the collection of motor fees by calendar years as made by the Secretary of State's office and can not be compared with the revenue deposited with the State Treasurer due to the fact that the law requires the Secretary of State to deposit his collections each thirty days following date of receipt.

TABLE LI—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

	1925	1926	1927	1928
January	$5,952,896.84	$6,572,605.72	$6,818,923.22	$6,967,951.02
February	2,355,086.26	2,526,795.92	3,026,301.85	2,730,734.89
March	1,480,242.01	1,757,830.67	2,103,205.27	2,201,635.82
April	1,241,706.96	925,950.19	897,990.62	1,120,161.00
May	599,550.75	800,539.64	679,154.38	928,836.35
June	370,950.36	430,240.42	391,463.70	458,913.59
July	378,403.54	434,947.22	384,748.73	436,271.05
August	219,491.73	258,046.32	226,755.11	284,675.54
September	159,867.43	168,085.08	147,037.12	180,227.45
October	108,431.17	102,286.57	95,761.15	134,726.36
November	50,544.89	52,548.86	53,286.00	57,331.26
December	19,710.19	17,331.25	14,966.14	20,065.55
Total	$12,936,882.13	$14,047,207.86	$14,839,593.29	$15,521,529.88

TABLE LII—SCHEDULE OF MOTOR FEES BY COUNTIES AS COLLECTED BY SECRETARY OF STATE.

	1925	1926	1927	1928
Cook	$4,788,890.00	$5,286,139.00	$5,778,102.00	$6,107,673.88
Adams	143,670.00	152,420.00	163,211.00	165,412.00
Alexander	32,750.00	36,390.00	35,334.00	35,615.00
Bond	33,568.00	36,830.00	36,490.00	37,004.00
Boone	42,090.00	44,010.00	44,666.00	45,116.00
Brown	18,674.00	20,950.00	19,719.00	19,840.00
Bureau	113,090.00	117,520.00	119,830.00	121,012.00
Calhoun	13,956.00	14,752.00	14,773.00	14,913.00
Carroll	52,201.00	56,375.00	58,944.00	60,112.00
Cass	47,299.00	46,990.00	44,378.00	45,989.00
Champaign	196,100.00	187,333.00	189,312.00	195,416.00
Christian	93,993.00	98,844.00	99,700.00	101,753.00
Clark	49,238.00	51,835.00	53,447.00	55,005.00
Clay	31,675.00	35,287.00	34,363.00	35,988.00
Clinton	41,410.00	44,540.00	47,158.00	48,956.00
Coles	83,698.00	89,826.00	92,171.00	96,676.00
Crawford	63,612.00	67,358.00	71,722.00	74,325.00
Cumberland	23,091.00	24,449.00	24,175.00	25,670.00
DeKalb	98,277.00	103,242.00	107,814.00	111,235.00
DeWitt	48,170.00	47,766.00	47,273.00	50,010.00
Douglas	48,314.00	51,035.00	50,771.00	52,115.00
DuPage	162,200.00	191,933.00	221,230.00	233,344.00
Edgar	66,799.00	70,861.00	70,711.00	71,987.00
Edwards	21,303.00	24,144.00	24,790.00	25,954.00
Effingham	43,612.00	46,537.00	48,055.00	49,977.00
Fayette	38,998.00	44,370.00	45,438.00	46,899.00
Ford	47,856.00	49,744.00	49,184.00	51,126.00
Franklin	120,910.00	122,890.00	125,990.00	129,567.00
Fulton	116,795.00	119,871.00	116,588.00	119,822.00
Gallatin	17,308.00	18,930.00	18,405.00	18,906.00
Greene	43,610.00	47,111.00	46,231.00	47,125.00
Grundy	46,882.00	51,643.00	52,109.00	53,961.00
Hamilton	17,600.00	19,945.00	18,980.00	19,101.00
Hancock	79,145.00	81,646.00	79,715.00	84,454.00
Hardin	7,610.00	7,644.00	7,782.00	7,924.00
Henderson	22,020.00	22,477.00	21,241.00	23,600.00
Henry	127,015.00	132,830.00	138,506.00	144,557.00
Iroquois	99,111.00	102,674.00	102,855.00	105,979.00
Jackson	71,600.00	79,011.00	77,890.00	78,990.00
Jasper	27,840.00	29,310.00	28,799.00	29,853.00
Jefferson	59,913.00	61,822.00	61,423.00	64,916.00
Jersey	23,010.00	25,380.00	25,088.00	26,322.00
JoDaviess	52,676.00	58,212.00	61,800.00	64,123.00
Johnson	16,222.00	18,079.00	17,212.00	17,877.00
Kane	264,120.00	296,115.00	320,060.00	345,456.00
Kankakee	111,680.00	114,200.00	119,211.00	125,122.00
Kendall	30,091.00	32,800.00	33,225.00	34,962.00
Knox	128,188.00	135,366.00	137,388.00	141,348.00
Lake	189,660.00	216,760.00	247,950.00	256,432.00
LaSalle	226,655.00	238,399.00	248,831.00	254,455.00
Lawrence	51,430.00	57,500.00	58,209.00	60,405.00
Lee	88,127.00	95,290.00	98,833.00	102,567.00

TABLE LII—Concluded.

	1925	1926	1927	1928
Livingston	105,951.00	108,964.00	108,366.00	112,134.00
Logan	70,745.00	72,866.00	70,827.00	71,996.00
Macon	177,140.00	190,187.00	207,012.00	215,567.00
Macoupin	111,684.00	113,950.00	114,328.00	116,531.00
Madison	251,480.00	282,570.00	302,770.00	313,399.00
Marion	76,391.00	83,693.00	92,601.00	95,005.00
Marshall	33,836.00	35,456.00	34,085.00	35,788.00
Mason	46,984.00	49,670.00	46,890.00	47,854.00
Massac	19,156.00	19,377.00	20,644.00	20,873.00
McDonough	74,280.00	78,900.00	78,633.00	81,645.00
McHenry	101,998.00	109,631.00	119,250.00	124,211.00
McLean	194,757.00	197,611.00	198,342.00	207,432.00
Menard	29,800.00	30,713.00	29,396.00	29,981.00
Mercer	52,350.00	53,722.00	53,089.00	54,774.00
Monroe	28,675.00	32,040.00	33,299.00	34,697.00
Montgomery	85,582.00	87,166.00	86,104.00	88,202.00
Morgan	69,988.00	78,040.00	78,110.00	81,263.00
Moultrie	31,812.00	33,468.00	32,817.00	33,456.00
Ogle	83,751.00	88,940.00	91,180.00	94,185.00
Peoria	288,980.00	303,012.00	318,096.00	333,129.00
Perry	43,333.00	46,566.00	46,592.00	47,974.00
Piatt	44,989.00	46,911.00	48,230.00	49,959.00
Pike	54,211.00	59,683.00	58,425.00	60,128.00
Pope	8,985.00	9,740.00	9,415.00	9,712.00
Pulaski	19,691.00	22,299.00	22,081.00	22,977.00
Putnam	14,383.00	15,390.00	15,200.00	16,178.00
Randolph	55,812.00	60,522.00	62,166.00	64,133.00
Richland	32,618.00	36,591.00	38,130.00	39,213.00
Rock Island	202,866.00	220,141.00	233,691.00	244,676.00
Saline	69,688.00	69,350.00	69,200.00	71,007.00
Sangamon	232,480.00	244,200.00	251,157.00	263,838.00
Schuyler	28,455.00	29,688.00	27,710.00	28,102.00
Scott	22,892.00	24,411.00	23,250.00	23,988.00
Shelby	61,860.00	65,855.00	65,411.00	66,714.00
Stark	31,156.00	33,310.00	31,619.00	32,125.00
St. Clair	282,399.00	301,232.00	326,795.00	340,446.00
Stephenson	105,896.00	112,340.00	119,754.00	123,568.00
Tazewell	92,570.00	96,834.00	100,177.00	103,755.00
Union	33,682.00	36,377.00	36,146.00	37,206.00
Vermilion	203,474.00	208,911.00	212,200.00	223,913.00
Wabash	28,580.00	33,360.00	32,190.00	32,897.00
Warren	67,913.00	73,988.00	71,329.00	72,874.00
Washington	35,618.00	39,142.00	40,212.00	41,677.00
Wayne	32,415.00	36,500.00	35,715.00	36,112.00
White	33,830.00	38,050.00	37,450.00	38,120.00
Whiteside	117,170.00	124,371.00	129,899.00	135,233.00
Will	201,864.00	235,100.00	249,113.00	268,452.00
Williamson	117,111.00	120,401.00	123,621.00	126,644.00
Winnebago	216,980.00	267,950.00	289,970.00	310,122.00
Woodford	57,741.00	60,633.86	59,824.29	60,818.00
Total	$12,969,754.00	$14,047,207.86	$14,839,593.29	$15,521,529.88
Less refunds	32,871.87			
Balance	$12,936,882.13	$14,047,207.86	$14,839,593.29	$15,521,529.88

TABLE LIII—STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS AND SOURCES FROM WHICH COLLECTED, JANUARY 1, 1928 TO DECEMBER 31, 1928.

Month.	Administration.	Engineering.	Tests.	Construction refunds.	Maintenance refunds.	Equipment rentals and sales.	Total.
January	$2,650.63	$ 12.09	$ 69.95	$68,333.61	$19,031.69		$90,097.97
February	87.04		13.45	24,998.23	1,893.06	$ 2,307.81	29,299.59
March	250.24		1,933.47	23,742.53	2,579.03	151.06	28,656.33
April	408.06		1,819.18	140.55	6,240.20	919.82	9,527.81
May	31.74	5.00	3,451.15	16,195.20	2,770.35	107.74	22,561.18
June	494.01		234.57	789.76	10,513.20	4,354.74	16,386.28
July	62.59	89.42	1,371.92	2,411.72	1,315.41	12,928.77	18,179.83
August	269.13	24.20	576.64	19,423.80	1,736.68	3,046.53	25,076.98
September	32.71	60.48	530.63	21,720.79	6,734.71	3,793.54	32,872.86
October	224.67		944.51	12,132.21	1,785.42	3,179.62	18,266.43
November	3.74	75.81	286.13	5,180.10	1,611.68		7,157.46
December	472.96	697.12	79.70	18,480.29	10,996.77	59.18	30,786.02
Total	$4,987.52	$964.12	$11,311.30	$213,548.79	$67,208.20	$30,848.81	$328,868.74

TABLE LIV—STATEMENT SHOWING ROAD FUND REVENUE (EXCLUSIVE OF GAS TAX) DEPOSITED IN STATE TREASURY BY MONTHS DURING THE CALENDAR YEAR 1928.

Month.	Motor fees.	Per cent of total.	Federal aid.	Miscellaneous.	Total.	Per cent of total.
January	$2,121,094.91	14.08		$43,449.96	$2,164,544.87	11.04
February	4,077,537.36	27.08	$ 86,520.02	52,536.87	4,216,594.25	21.50
March	3,141,960.26	20.85	351,981.20	27,784.50	3,521,725.96	17.96
April	1,831,810.52	12.15	47,256.17	34,567.22	1,913,633.91	9.76
May	1,189,646.81	7.89	231,923.56	30,080.19	1,451,650.56	7.40
June	896,825.92	5.95	407,075.60	29,882.72	1,333,784.24	6.80
July	370,592.02	2.46	130,398.37	56,947.59	557,937.98	2.84
August	391,385.71	2.60	63,499.47	15,367.59	470,252.77	2.40
September	239,439.75	1.58	1,683,267.12	43,424.00	1,966,130.87	10.03
October	177,136.70	1.17		54,446.31	231,583.01	1.18
November	116,241.37	.77	1,052,730.49	20,514.83	1,189,486.69	6.06
December	516,159.00	3.42		16,554.32	532,713.32	3.04
Total	$15,069,830.33	100.00	$4,054,652.00	$425,556.10	$19,550,038.43	100.00

TABLE LV—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Gas tax.	Total.
1911	$ 74,552.59				$ 74,552.59
1912	364,708.03				364,708.03
1913	499,802.45				499,802.45
1914	700,233.00				700,233.00
1915	903,284.09				903,284.09
1916	1,238,483.92				1,238,483.92
1917	1,629,445.26				1,629,445.26
1918	2,770,084.60		$ 85.00		2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50		3,765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68		11,111,995.56
Sub-total	$17,273,087.13	$5,724,799.05	$60,390.18		$23,058,276.36
1921	$ 6,862,125.83	$3,802,430.46	$221,645.55		$10,886,201.84
1922	7,904,219.71	1,733,334.86	132,495.77		9,770,050.34
1923	9,689,702.77	4,257,276.06	135,485.61		14,082,464.44
1924	11,557,838.94	3,565,058.69	300,045.58		15,422,943.21
1925	13,050,977.39	2,717,923.43	514,260.69		16,283,161.51
1926	13,937,579.64	2,036,921.95	214,330.36		16,188,831.95
1927	15,589,365.19	2,997,912.78	216,671.59	$3,953,047.72	22,756,997.28
1928	15,069,830.33	4,054,652.00	425,556.10	2,439,728.14	21,989,766.57
Sub-total	$93,661,639.80	$25,165,510.23	$2,160,491.25	$6,392,775.86	$127,380,417.14
Grand total	$110,934,726.93	$30,790,309.28	$2,220,881.43	$6,392,775.86	$150,438,693.50

TABLE LVI—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For maintenance.	For State highways.	For county refunds.
1913	$ 400,000.00				
1914	700,000.00				
1915	1,000,000.00				
1916	1,000,000.00				
1917	1,200,000.00	$ 1,326,000.00			
1919	500,000.00	26,600,000.00			
1921			$3,000,000.00	$20,000,000.00	$3,889,382.23
1923			3,000,000.00	20,000,000.00	4,025,632.56
1925			6,000,000.00	35,000,000.00	2,704,818.95
1927			6,000,000.00	27,000,000.00	3,000,000.00
Total	$4,800,000.00	$27,926,000.00	$18,000,000.00	$102,000,000.00	$13,619,833.74

TABLE LVI—Continued.

Year.	For cement plant.	For Fay Hunsley relief.	For gravel plant.	Principal and interest on highway bonds.	Refunds to municipalities.
1913					
1914					
1915					
1916					
1917					
1919			$125,000.00		
1921	$5,000,000.00	$4,000.00		$ 1,000,000.00	
1923	5,000,000.00			4,000,000.00	
1925	5,000,000.00			12,320,000.00	$300,000.00
1927	5,000,000.00			13,854,420.00	300,000.00
Total	$20,000,000.00	$4,000.00	$125,000.00	$31,174,420.00	$600,000.00

TABLE LVI—Concluded.

Year.	Construction through municipalities.	Bridge at Mt. Carmel.	Refund on Georgetown Bridge.	Total.
1913				$ 400,000.00
1914				700,000.00
1915				1,000,000.00
1916				1,000,000.00
1917				2,526,000.00
1919				27,225,000.00
1921				32,893,382.23
1923				36,025,632.56
1925	$1,000,000.00			62,324,818.95
1927	500,000.00	$225,000.00	$19,500.00	55,898,920.00
Total	$1,500,000.00	$225,000.00	$19,500.00	$219,993,753.74

TABLE LVII—EXPENDITURES FROM THE ROAD FUND—1914 TO 1928.

Year.	Administration and Engineering.	State Aid construction.	State Aid reconstruction.	Federal Aid and S. B. I. construction.	Surfacing of gaps and detours.
1914		$364,202.39			
1915	$ 22,128.34	630,612.30			
1916	3,920.88	656,641.05			
1917	113,318.90	992,754.54			
1918	21,896.36	334,224.06		$ 190,578.78	
1919	568,099.29	441,060.76		3,882,213.47	
1920	1,054,178.76	209,286.41		10,109,977.55	
Sub-total	$1,783,542.53	$3,628,781.51		$14,182,769.80	
1921	$ 966,262.64	$115,104.51		$10,966,994.05	
1922	575,440.81	32,768.68		6,262,162.56	
1923	1,146,967.70	25,278.46		8,087,246.99	
1924	1,164,610.99		$ 619.92	11,306,557.30	$15,869.98
1925	647,380.34		263.24	8,540,968.85	30,065.42
1926	1,010,249.17		20,021.35	7,529,889.74	17,044.83
1927	986,149.46		491,897.15	7,684,245.51	14,519.21
1928	1,293,447.86		122,725.48	6,556,539.06	13,436.05
Sub-total	$7,790,508.97	$173,151.65	$635,527.14	$66,934,604.06	$90,935.49
Total	$9,574,051.50	$3,801,933.16	$635,527.14	$81,117,373.86	$90,935.49

TABLE LVII—Continued.

Year.	Additions and betterments.	Maintenance.	Refunds to counties.	Refund on Georgetown Bridge.	Fay Hunsley relief.
1914					
1915		$ 14,657.73			
1916		17,125.25			
1917		34,307.21			
1918		37,303.98			
1919		84,614.37			
1920		208,802.55			
Sub-total		$396,811.09			
1921		$ 358,658.85	$ 719,273.18		$4,000.00
1922		640,503.01	1,798,184.50		
1923		1,110,034.41	1,411,337.49		
1924	$ 35,123.82	2,044,860.69	1,176,893.14		
1925	50,791.99	1,834,637.74	602,050.80		
1926	52,844.88	2,264,770.58	499,202.93		
1927	81,729.73	2,721,444.45	368,187.25	$19,500.00	
1928	113,925.00	2,859,756.51	1,540,435.85		
Sub-total	$334,415.42	$13,834,666.24	$8,115,565.14	$19,500.00	$4,000.00
Total	$334,415.42	$14,231,477.33	$8,115,565.14	$19,500.00	$4,000.00

TABLE LVII—Concluded.

Year.	Interest and principal on $60,000,000.00 and $100,000,000.00 bonds.	Construction through municipalities.	Refunds to municipalities.	Total.
1914				$ 364,202.39
1915				667,398.37
1916				677,687.18
1917				1,140,380.65
1918				584,003.18
1919				4,975,987.89
1920				11,582,245.27
Sub-total				$19,991,904.93
1921				$13,130,293.23
1922	$ 96,120.00			9,405,179.56
1923	661,340.00			12,442,205.05
1924	1,388,813.35			17,133,349.19
1925	2,687,303.72	$ 19,592.59		14,413,054.69
1926	5,510,843.18	538,374.33		17,443,240.99
1927	5,606,009.75	325,859.68	$210,864.06	18,510,406.25
1928	6,149,016.11	13,300.39	89,795.19	18,752,377.50
Sub-total	$22,099,446.11	$897,126.99	$300,659.25	$121,230,106.46
Total	$22,099,446.11	$897,126.99	$300,659.25	$141,222,011.39

TABLE LVIII—STATEMENT SHOWING ROAD FUND BALANCES, RECEIPTS AND EXPENDITURES BY MONTHS FOR THE CALENDAR YEAR 1928 (EXCLUSIVE OF GAS TAX).

Month.	Balance at beginning of month.	Receipts during month.	Per cent of total receipts.	Total.
January	$2,026,247.32	$2,164,544.87	11.04	$4,190,792.19
February	3,582,786.52	4,216,594.25	21.50	7,799,380.77
March	6,961,425.13	3,521,725.96	17.96	10,483,151.09
April	7,999,468.82	1,913,633.91	9.76	9,913,102.73
May	8,472,130.75	1,451,650.56	7.40	9,923,781.31
June	3,154,338.97	1,333,784.24	6.80	4,488,123.21
July	3,892,923.98	557,937.98	2.84	4,450,861.96
August	2,491,924.77	470,252.77	2.40	2,962,177.54
September	2,635,795.89	1,966,130.87	10.02	4,601,926.76
October	2,492,924.96	231,583.01	1.18	2,724,507.97
November	2,319,528.06	1,189,486.69	6.06	3,509,014.75
December	2,482,249.01	532,713.32	3.04	3,014,962.33
Total	$2,026,247.32	$19,550,038.43	100.00	$21,576,285.75

TABLE LVIII—Concluded.

Month.	Expenditures during month.	Per cent of total expenditures.	Balance at end of month.
January	$ 608,005.67	3.24	$3,582,786.52
February	837,955.64	4.47	6,961,425.13
March	2,483,682.27	13.24	7,999,468.82
April	1,440,971.98	7.68	8,472,130.75
May	6,769,442.34	36.10	3,154,338.97
June	595,199.23	3.17	3,892,923.98
July	1,958,937.19	10.45	2,491,924.77
August	326,381.65	1.74	2,635,795.89
September	2,109,001.80	11.25	2,492,924.96
October	404,979.91	2.16	2,319,528.06
November	1,026,765.74	5.48	2,482,249.01
December	191,054.08	1.02	2,823,908.25
Total	$18,752,377.50	100.00	$2,823,908.25

TABLE LIX—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $60,000,000.00—4% BONDS.

Total Bond Voted November 4, 1918	$60,000,000.00
Total Bond Authorized for Sale	$60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each year.
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		2,160,000.00	2,160,000.00	4,320,000.00
1926	$2,000,000.00	2,400,000.00	4,400,000.00	8,720,000.00
1927	2,000,000.00	2,320,000.00	4,320,000.00	13,040,000.00
1928	2,000,000.00	2,240,000.00	4,240,000.00	17,280,000.00
1929	2,000,000.00	2,160,000.00	4,160,000.00	21,440,000.00
1930	2,000,000.00	2,080,000.00	4,080,000.00	25,520,000.00
1931	2,000,000.00	2,000,000.00	4,000,000.00	29,520,000.00
1932	2,000,000.00	1,920,000.00	3,920,000.00	33,440,000.00
1933	2,000,000.00	1,840,000.00	3,840,000.00	37,280,000.00
1934	2,000,000.00	1,760,000.00	3,760,000.00	41,040,000.00
1935	3,000,000.00	1,680,000.00	4,680,000.00	45,720,000.00
1936	3,000,000.00	1,560,000.00	4,560,000.00	50,280,000.00
1937	3,000,000.00	1,440,000.00	4,440,000.00	54,720,000.00
1938	4,000,000.00	1,320,000.00	5,320,000.00	60,040,000.00
1939	4,000,000.00	1,160,000.00	5,160,000.00	65,200,000.00
1940	5,000,000.00	1,000,000.00	6,000,000.00	71,200,000.00
1941	5,000,000.00	800,000.00	5,800,000.00	77,000,000.00
1942	5,000,000.00	600,000.00	5,600,000.00	82,600,000.00
1943	5,000,000.00	400,000.00	5,400,000.00	88,000,000.00
1944	5,000,000.00	200,000.00	5,200,000.00	93,200,000.00
Total	$60,000,000.00	$33,200,000.00	$93,200,000.00	$93,200,000.00

TABLE LX—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sale—Oct. 25, 1921. Date of issue—Nov. 1, 1921. Rate $94.020. Yield $4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$ 100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE LXI—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$6,000,000.00—4% BONDS.

Date of sale—April 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE LXII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue—May 1, 1922. Rate $99.688. Yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE LXIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—March 1, 1923. Rate $98.183. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$240,000.00	$ 240,000.00	$ 240,000.00
1925		240,000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1933		240,000.00	240,000.00	2,400,000.00
1934		240,000.00	240,000.00	2,640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120,000.00
1937		240,000.00	240,000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000,000.00	160,000.00	1,160,000.00	6,960,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	9,160,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE LXIV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Yield 4.40.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$ 280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	$ 500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220,000.00	720,000.00	3,560,000.00
1930	500,000.00	200,000.00	700,000.00	4,260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600,000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1,000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40,000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE LXV—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16, 1923. Date of issue—Oct. 1, 1923. Rate $94.41. Yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580,000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE LXVI—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1929		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

TABLE LXVII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 8—$9,000,000.00—4% BONDS.

Date of sale—June 3, 1924. Date of issue—June 1, 1924. Rate $96.525. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$270,000.00	$ 270,000.00	$ 270,000.00
1926		360,000.00	360,000.00	630,000.00
1927		360,000.00	360,000.00	990,000.00
1928		360,000.00	360,000.00	1,360,000.00
1929		360,000.00	360,000.00	1,710,000.00
1930		360,000.00	360,000.00	2,070,000.00
1931		360,000.00	360,000.00	2,430,000.00
1932		360,000.00	360,000.00	2,790,000.00
1933		360,000.00	360,000.00	3,150,000.00
1934		360,000.00	360,000.00	3,510,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,370,000.00
1936	500,000.00	340,000.00	840,000.00	5,210,000.00
1937		320,000.00	320,000.00	5,530,000.00
1938		320,000.00	320,000.00	5,850,000.00
1939		320,000.00	320,000.00	6,170,000.00
1940	1,000,000.00	320,000.00	1,320,000.00	7,490,000.00
1941	1,000,000.00	280,000.00	1,280,000.00	8,770,000.00
1942	2,000,000.00	240,000.00	2,240,000.00	11,010,000.00
1943	2,000,000.00	160,000.00	2,160,000.00	13,170,000.00
1944	2,000,000.00	80,000.00	2,080,000.00	15,250,000.00
Total	$9,000,000.00	$6,250,000.00	$15,250,000.00	$15,250,000.00

TABLE LXVIII—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—Aug. 15, 1924. Date of issue—Aug. 1, 1924. Rate $99.109. Yield 4.08.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$210,000.00	$ 210,000.00	$ 210,000.00
1926		360,000.00	360,000.00	570,000.00
1927		360,000.00	360,000.00	930,000.00
1928		360,000.00	360,000.00	1,290,000.00
1929		360,000.00	360,000.00	1,650,000.00
1930		360,000.00	360,000.00	2,010,000.00
1931		360,000.00	360,000.00	2,370,000.00
1932		360,000.00	360,000.00	2,730,000.00
1923		360,000.00	360,000.00	3,090,000.00
1934		360,000.00	360,000.00	3,450,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,310,000.00
1936	500,000.00	340,000.00	840,000.00	5,150,000.00
1937		320,000.00	320,000.00	5,470,000.00
1938	1,000,000.00	320,000.00	1,320,000.00	6,790,000.00
1939	1,000,000.00	280,000.00	1,280,000.00	8,070,000.00
1940	1,000,000.00	240,000.00	1,240,000.00	9,310,000.00
1941	1,000,000.00	200,000.00	1,200,000.00	10,510,000.00
1942		160,000.00	160,000.00	10,670,000.00
1943	1,000,000.00	160,000.00	1,160,000.00	11,830,000.00
1944	3,000,000.00	120,000.00	3,120,000.00	14,950,000.00
Total	$9,000,000.00	$5,950,000.00	$14,950,000.00	$14,950,000.00

TABLE LXIX—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $60,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	94,020	4.83	$5,000,000.00	$4,709,477.78	$4,709,477.78	----------
1922	Apr. 13	98,875	4.19	6,000,000.00	5,940,111.11	5,940,111.11	----------
1922	Sept. 18	99.688	4.04	6,000,000.00	6,083,855.65	6,083,855.65	----------
1923	Feb. 20	98.183	4.15	6,000,000.00	5,908,333.34	5,908,333.34	----------
1923	May 25	97.000	4.40	7,000,000.00	6,837,667.68	6,837,667.68	----------
1923	Oct. 16	94.41	4.68	6,000,000.00	5,687,266.68	5,687,266.68	----------
1923	Dec. 22	94.46	4.50	6,000,000.00	5,678,266.67	5,667,600.00	$10,666.67
1924	June 3	96.525	4.29	9,000,000.00	8,704,200.00	8,704,200.00	----------
1924	Aug. 15	99.109	4.08	9,000,000.00	8,947,800.00	8,919,800.00	28,000.00
Total	----------	97.4949	4.32	$60,000,000.00	$58,496,978.91	$58,458,312.24	$38,666.67

NOTE.—The figure of 4.32 shown under Interest Yield represents the weighted average yield of all series sold.

The figure of 97.4949 shown in the sale rate column represents the average sale rate on all series sold

TABLE LXX—APPROPRIATIONS PAYABLE FROM $60,000,000.00 BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922	----------	----------	----------
1923	30,000,000.00		30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

TABLE LXXI—EXPENDITURES FROM $60,000,000.00 BOND ISSUE FUND—1921 TO 1924.

Year.	Administration and engineering.	Equipment.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.	Additions and betterments.	Refunds to counties.	Total.
1921	$ 263,200.43	$ 1,385.84	$ 2,196,414.38	--------	----------	$ 8,000.00	$ 2,469,000.65
1922	1,142,994.16	16,061.96	11,261,655.37	--------	----------	637,820.93	13,058,532.42
1923	1,124,027.08	14,740.53	17,469,029.10	--------	----------	605,182.71	19,212,979.42
1924	1,629,293.10	27,196.14	22,054,166.95	$681.92	$6,461.64	----------	23,717,799.75
Total	$4,159,514.77	$59,384.47	$52,981,265.80	$681.92	$6,461.64	$1,251,003.64	$58,458,312.24

TABLE LXXII—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $77,000,000—4% BONDS SOLD TO DECEMBER 31, 1928. TOTAL BONDS VOTED NOVEMBER 4, 1924—$100,000,000.00. TOTAL BONDS AUTHORIZED FOR SALE—$100,000,000.00.

Year in which principal is to be retired and interest paid.	Principal to be retired March 1st each year.	Principal to be retired May 1st each year.	Total principal to be retired during year.	Interest to be paid March 1st each year.	Interest to be paid May 1st each year.	Interest to be paid Sept. 1st each year.	Interest to be paid Nov. 1st each year.	Total interest payable each year.	Total payable all series each year.
1925					$ 53,333.33	$400,000.00	$ 80,000.00	$ 533,333.33	$ 533,333.33
1926				$400,000.00	130,000.00	400,000.00	180,000.00	1,110,000.00	1,110,000.00
1927				400,000.00	180,000.00	400,000.00	320,000.00	1,300,000.00	1,300,000.00
1928				400,000.00	420,000.00	486,666.67	620,000.00	1,926,666.67	1,926,666.67
1929				660,000.00	880,000.00	660,000.00	880,000.00	3,080,000.00	3,080,000.00
1930				660,000.00	880,000.00	660,000.00	880,000.00	3,080,000.00	3,080,000.00
1931				660,000.00	880,000.00	660,000.00	880,000.00	3,080,000.00	3,080,000.00
1932		$ 500,000.00	$ 500,000.00	660,000.00	880,000.00	660,000.00	870,000.00	3,070,000.00	3,570,000.00
1933		500,000.00	500,000.00	660,000.00	870,000.00	660,000.00	860,000.00	3,050,000.00	3,550,000.00
1934		500,000.00	500,000.00	660,000.00	860,000.00	660,000.00	850,000.00	3,030,000.00	3,530,000.00
1935		500,000.00	500,000.00	660,000.00	850,000.00	660,000.00	840,000.00	3,010,000.00	3,510,000.00
1936		500,000.00	500,000.00	660,000.00	840,000.00	660,000.00	830,000.00	2,990,000.00	3,490,000.00
1937		500,000.00	500,000.00	660,000.00	830,000.00	660,000.00	820,000.00	2,970,000.00	3,470,000.00
1938		500,000.00	500,000.00	660,000.00	820,000.00	660,000.00	810,000.00	2,950,000.00	3,450,000.00
1939		500,000.00	500,000.00	660,000.00	810,000.00	660,000.00	800,000.00	2,930,000.00	3,430,000.00
1940				660,000.00	800,000.00	660,000.00	800,000.00	2,920,000.00	2,920,000.00
1941				660,000.00	800,000.00	660,000.00	800,000.00	2,920,000.00	2,920,000.00
1942				660,000.00	800,000.00	660,000.00	800,000.00	2,920,000.00	2,920,000.00
1943				660,000.00	800,000.00	660,000.00	800,000.00	2,920,000.00	2,920,000.00
1944				660,000.00	800,000.00	660,000.00	800,000.00	2,920,000.00	2,920,000.00
1945	$2,000,000.00	2,500,000.00	4,500,000.00	660,000.00	800,000.00	620,000.00	750,000.00	2,830,000.00	7,330,000.00
1946	2,000,000.00	2,500,000.00	4,500,000.00	620,000.00	750,000.00	580,000.00	700,000.00	2,650,000.00	7,150,000.00
1947	2,000,000.00	2,500,000.00	4,500,000.00	580,000.00	700,000.00	540,000.00	650,000.00	2,470,000.00	6,970,000.00
1948	2,000,000.00	2,500,000.00	4,500,000.00	540,000.00	650,000.00	500,000.00	600,000.00	2,290,000.00	6,790,000.00
1949	2,500,000.00	2,500,000.00	5,000,000.00	500,000.00	600,000.00	450,000.00	550,000.00	2,100,000.00	7,100,000.00
1950	2,500,000.00	2,500,000.00	5,000,000.00	450,000.00	550,000.00	400,000.00	500,000.00	1,900,000.00	6,900,000.00
1951	2,500,000.00	2,500,000.00	5,000,000.00	400,000.00	500,000.00	350,000.00	450,000.00	1,700,000.00	6,700,000.00
1952	2,500,000.00	2,500,000.00	5,000,000.00	350,000.00	450,000.00	300,000.00	400,000.00	1,500,000.00	6,500,000.00
1953	2,500,000.00	3,000,000.00	5,500,000.00	300,000.00	400,000.00	250,000.00	340,000.00	1,290,000.00	6,790,000.00
1954	2,500,000.00	3,000,000.00	5,500,000.00	250,000.00	340,000.00	200,000.00	280,000.00	1,070,000.00	6,570,000.00
1955	2,000,000.00	3,500,000.00	5,500,000.00	200,000.00	280,000.00	160,000.00	210,000.00	850,000.00	6,350,000.00
1956	2,000,000.00	3,500,000.00	5,500,000.00	160,000.00	210,000.00	120,000.00	140,000.00	630,000.00	6,130,000.00
1957	3,000,000.00	3,500,000.00	6,500,000.00	120,000.00	140,000.00	60,000.00	70,000.00	390,000.00	6,890,000.00
1958	3,000,000.00	3,500,000.00	6,500,000.00	60,000.00	70,000.00			130,000.00	6,630,000.00
Total	$33,000,000.00	$44,000,000.00	$77,000,000.00	$16,950,000.00	$20,623,333.33	$16,776,666.67	$20,160,000.00	$74,510,000.00	$151,510,000.00

TABLE LXXIII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 1—$4,000,000.00—4% BONDS.

Date of sale—Dec. 30, 1924. Date of issue—Jan. 1, 1925. Rate $97.5575. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925		$53,333.33	$80,000.00	$133,333.33	$133,333.33
1926		80,000.00	80,000.00	160,000.00	160,000.00
1927		80,000.00	80,000.00	160,000.00	160,000.00
1928		80,000.00	80,000.00	160,000.00	160,000.00
1929		80,000.00	80,000.00	160,000.00	160,000.00
1930		80,000.00	80,000.00	160,000.00	160,000.00
1931		80,000.00	80,000.00	160,000.00	160,000.00
1932	$500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1933	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1934	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1935	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1936	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1937	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1938	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1939	500,000.00	10,000.00		10,000.00	510,000.00
Total	$4,000,000.00	$893,333.33	$840,000.00	$1,733,333.33	$5,733,333.33

TABLE LXXIV—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$10,000,000.00—4% BONDS.

Date of sale—May 20, 1925. Date of issue—Mar. 1, 1925. Rate $99.881. Yield 4.008.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300.000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LXXV—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$10,000,000.00—4% BONDS.

Date of sale—Sept. 1, 1925. Date of issue—Mar. 1, 1925. Rate $96.422. Yield 4.24.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE LXXVI—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$5,000,000.00—4% BONDS.

Date of sale—Feb. 17, 1926. Date of issue—Feb. 1, 1926. Rate $99.062. Yield 4.062.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1926		$ 50,000.00	$100,000.00	$150,000.00	$150,000.00
1927		100,000.00	100,000.00	200,000.00	200,000.00
1928		100,000.00	100,000.00	200,000.00	200,000.00
1929		100,000.00	100,000.00	200,000.00	200,000.00
1930		100,000.00	100,000.00	200,000.00	200,000.00
1931		100,000.00	100,000.00	200,000.00	200,000.00
1932		100,000.00	100,000.00	200,000.00	200,000.00
1933		100,000.00	100,000.00	200,000.00	200,000.00
1934		100,000.00	100,000.00	200,000.00	200,000.00
1935		100,000.00	100,000.00	200,000.00	200,000.00
1936		100,000.00	100,000.00	200,000.00	200,000.00
1937		100,000.00	100,000.00	200,000.00	200,000.00
1938		100,000.00	100,000.00	200,000.00	200,000.00
1939		100,000.00	100,000.00	200,000.00	200,000.00
1940		100,000.00	100,000.00	200,000.00	200,000.00
1941		100,000.00	100,000.00	200,000.00	200,000.00
1942		100,000.00	100,000.00	200,000.00	200,000.00
1943		100,000.00	100,000.00	200,000.00	200,000.00
1944		100,000.00	100,000.00	200,000.00	200,000.00
1945	$500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1946	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1947	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1948	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1949	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1950	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1951	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1952	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1953	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1954	500,000.00	10,000.00		10,000.00	510,000.00
Total	$5,000,000.00	$2,400,000.00	$2,350,000.00	$4,750,000.00	$9,750,000.00

TABLE LXXVII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 5—$6,000,000.00—4% BONDS.

Date of sale—April 26, 1927. Date of issue—May 1, 1927. Rate $101.601. Yield 3.895.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1927			$120,000.00	$120,000.00	$120,000.00
1928		$120,000.00	120,000.00	240,000.00	240,000.00
1929		120,000.00	120,000.00	240,000.00	240,000.00
1930		120,000.00	120,000.00	240,000.00	240,000.00
1931		120,000.00	120,000.00	240,000.00	240,000.00
1932		120,000.00	120,000.00	240,000.00	240,000.00
1933		120,000.00	120,000.00	240,000.00	240,000.00
1934		120,000.00	120,000.00	240,000.00	240,000.00
1935		120,000.00	120,000.00	240,000.00	240,000.00
1936		120,000.00	120,000.00	240,000.00	240,000.00
1937		120,000.00	120,000.00	240,000.00	240,000.00
1938		120,000.00	120,000.00	240,000.00	240,000.00
1939		120,000.00	120,000.00	240,000.00	240,000.00
1940		120,000.00	120,000.00	240,000.00	240,000.00
1941		120,000.00	120,000.00	240,000.00	240,000.00
1942		120,000.00	120,000.00	240,000.00	240,000.00
1943		120,000.00	120,000.00	240,000.00	240,000.00
1944		120,000.00	120,000.00	240,000.00	240,000.00
1945	$500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1946	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1947	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1948	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1949	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1950	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1951	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1952	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1953	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1954	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1955	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1956	500,000.00	10,000.00		10,000.00	510,000.00
Total	$6,000,000.00	$2,820,000.00	$2,820,000.00	$5,640,000.00	$11,640,000.00

TABLE LXXVIII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 11, 1927. Date of issue—Oct. 1, 1927. Rate $101.016. Yield 3.930.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1927			$ 20,000.00	$ 20,000.00	$ 20,000.00
1928		$120,000.00	120,000.00	240,000.00	240,000.00
1929		120,000.00	120,000.00	240,000.00	240,000.00
1930		120,000.00	120,000.00	240,000.00	240,000.00
1931		120,000.00	120,000.00	240,000.00	240,000.00
1932		120,000.00	120,000.00	240,000.00	240,000.00
1933		120,000.00	120,000.00	240,000.00	240,000.00
1934		120,000.00	120,000.00	240,000.00	240,000.00
1935		120,000.00	120,000.00	240,000.00	240,000.00
1936		120,000.00	120,000.00	240,000.00	240,000.00
1937		120,000.00	120,000.00	240,000.00	240,000.00
1938		120,000.00	120,000.00	240,000.00	240,000.00
1939		120,000.00	120,000.00	240,000.00	240,000.00
1940		120,000.00	120,000.00	240,000.00	240,000.00
1941		120,000.00	120,000.00	240,000.00	240,000.00
1942		120,000.00	120,000.00	240,000.00	240,000.00
1943		120,000.00	120,000.00	240,000.00	240,000.00
1944		120,000.00	120,000.00	240,000.00	240,000.00
1945	$500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1946	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1947	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1948	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1949	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1950	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1951	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1952	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1953	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1954	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1955	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1956	500,000.00	10,000.00		10,000.00	510,000.00
Total	$6,000,000.00	$2,820,000.00	$2,720,000.00	$5,540,000.00	$11,540,000.00

TABLE LXXIX—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION SERIES NO. 7—$7,000,000.00—4% BONDS.

Date of sale—May 15, 1928. Date of issue—May 1, 1928. Rate $99.321. Yield 4.045.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928			$140,000.00	$140,000.00	$140,000.00
1929		$140,000.00	140,000.00	280,000.00	280,000.00
1930		140,000.00	140,000.00	280,000.00	280,000.00
1931		140,000.00	140,000.00	280,000.00	280,000.00
1932		140,000.00	140,000.00	280,000.00	280,000.00
1933		140,000.00	140,000.00	280,000.00	280,000.00
1934		140,000.00	140,000.00	280,000.00	280,000.00
1935		140,000.00	140,000.00	280,000.00	280,000.00
1936		140,000.00	140,000.00	280,000.00	280,000.00
1937		140,000.00	140,000.00	280,000.00	280,000.00
1938		140,000.00	140,000.00	280,000.00	280,000.00
1939		140,000.00	140,000.00	280,000.00	280,000.00
1940		140,000.00	140,000.00	280,000.00	280,000.00
1941		140,000.00	140,000.00	280,000.00	280,000.00
1942		140,000.00	140,000.00	280,000.00	280,000.00
1943		140,000.00	140,000.00	280,000.00	280,000.00
1944		140,000.00	140,000.00	280,000.00	280,000.00
1945	$500,000.00	140,000.00	130,000.00	270,000.00	770,000,00
1946	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1947	500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1948	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1949	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1950	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1951	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1952	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1953	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1954	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1955	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1956	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1957	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1958	500,000.00	10,000.00		10,000.00	510,000.00
Total	$7,000,000.00	$3,290,000.00	$3,290,000.00	$6,580,000.00	$13,580,000.00

TABLE LXXX—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 8—$13,000,000.00—4% BONDS.

Date of sale—July 17, 1928. Date of issue—July 1, 1928. Rate $96.266. Yield 4.225.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928			$ 86,666.67	$ 86,666.67	$ 86,666.67
1929		$260,000.00	260,000.00	520,000.00	520,000.00
1930		260,000.00	260,000.00	520,000.00	520,000.00
1931		260,000.00	260,000.00	520,000.00	520,000.00
1932		260,000.00	260,000.00	520,000.00	520,000.00
1933		260,000.00	260,000.00	520,000.00	520,000.00
1934		260,000.00	260,000.00	520,000.00	520,000.00
1935		260,000.00	260,000.00	520,000.00	520,000.00
1936		260,000.00	260,000.00	520,000.00	520,000.00
1937		260,000.00	260,000.00	520,000.00	520,000.00
1938		260,000.00	260,000.00	520,000.00	520,000.00
1939		260,000.00	260,000.00	520,000.00	520,000.00
1940		260,000.00	260,000.00	520,000.00	520,000.00
1941		260,000.00	260,000.00	520,000.00	520,000.00
1942		260,000.00	260,000.00	520,000.00	520,000.00
1943		260,000.00	260,000.00	520,000.00	520,000.00
1944		260,000.00	260,000.00	520,000.00	520,000.00
1945		260,000.00	260,000.00	520,000.00	520,000.00
1946		260,000.00	260,000.00	520,000.00	520,000.00
1947		260,000.00	260,000.00	520,000.00	520,000.00
1948		260,000.00	260,000.00	520,000.00	520,000.00
1949	$ 500,000.00	260,000.00	250,000.00	510,000.00	1,010,000.00
1950	500,000.00	250,000.00	240,000.00	490,000.00	990,000.00
1951	500,000.00	240,000.00	230,000.00	470,000.00	970,000.00
1952	500,000.00	230,000.00	220,000.00	450,000.00	950,000.00
1953	500,000.00	220,000.00	210,000.00	430,000.00	930,000.00
1954	500,000.00	210,000.00	200,000.00	410,000.00	910,000.00
1955	2,000,000.00	200,000.00	160,000.00	360,000.00	2,360,000.00
1956	2,000,000.00	160,000.00	120,000.00	280,000.00	2,280,000.00
1957	3,000,000.00	120,000.00	60,000.00	180,000.00	3,180,000.00
1958	3,000,000.00	60,000.00		60,000.00	3,060,000.00
Total	$13,000,000.00	$7,150,000.00	$6,976,666.67	$14,126,666.67	$27,126,666.67

TABLE LXXXI—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1928. Date of issue—Sept. 1, 1928. Rate $97.255. Yield 4.185.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928			$ 60,000.00	$ 60,000.00	$ 60,000.00
1929		180,000.00	180,000.00	360,000.00	360,000.00
1930		180,000.00	180,000.00	360,000.00	360,000.00
1931		180,000.00	180,000.00	360,000.00	360,000.00
1932		180,000.00	180,000.00	360,000.00	360,000.00
1933		180,000.00	180,000.00	360,000.00	360,000.00
1934		180,000.00	180,000.00	360,000.00	360,000.00
1935		180,000.00	180,000.00	360,000.00	360,000.00
1936		180,000.00	180,000.00	360,000.00	360,000.00
1937		180,000.00	180,000.00	360,000.00	360,000.00
1938		180,000.00	180,000.00	360,000.00	360,000.00
1939		180,000.00	180,000.00	360,000.00	360,000.00
1940		180,000.00	180,000.00	360,000.00	360,000.00
1941		180,000.00	180,000.00	360,000.00	360,000.00
1942		180,000.00	180,000.00	360,000.00	360,000.00
1943		180,000.00	180,000.00	360,000.00	360,000.00
1944		180,000.00	180,000.00	360,000.00	360,000.00
1945	500,000.00	180,000.00	170,000.00	350,000.00	850,000.00
1946	500,000.00	170,000.00	160,000.00	330,000.00	830,000.00
1947	500,000.00	160,000.00	150,000.00	310,000.00	810,000.00
1948	500,000.00	150,000.00	140,000.00	290,000.00	790,000.00
1949	500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1950	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1951	500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1952	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1953	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1954	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1955	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1956	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1957	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1958	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$9,000,000.00	$4,430,000.00	$4,310,000.00	$8,740,000.00	$17,740,000.00

TABLE LXXXII—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 10—$7,000,000.00—4% BONDS.

Date of sale—Nov. 8, 1928. Date of issue—Nov. 1, 1928. Rate $97.55. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928					
1929		$140,000.00	$140,000.00	$280,000.00	$280,000.00
1930		140,000.00	140,000.00	280,000.00	280,000.00
1931		140,000.00	140,000.00	280,000.00	280,000.00
1932		140,000.00	140,000.00	280,000.00	280,000.00
1933		140,000.00	140,000.00	280,000.00	280,000.00
1934		140,000.00	140,000.00	280,000.00	280,000.00
1935		140,000.00	140,000.00	280,000.00	280,000.00
1936		140,000.00	140,000.00	280,000.00	280,000.00
1937		140,000.00	140,000.00	280,000.00	280,000.00
1938		140,000.00	140,000.00	280,000.00	280,000.00
1939		140,000.00	140,000.00	280,000.00	280,000.00
1940		140,000.00	140,000.00	280,000.00	280,000.00
1941		140,000.00	140,000.00	280,000.00	280,000.00
1942		140,000.00	140,000.00	280,000.00	280,000.00
1943		140,000.00	140,000.00	280,000.00	280,000.00
1944		140,000.00	140,000.00	280,000.00	280,000.00
1945		140,000.00	140,000.00	280,000.00	280,000.00
1946		140,000.00	140,000.00	280,000.00	280,000.00
1947		140,000.00	140,000.00	280,000.00	280,000.00
1948		140,000.00	140,000.00	280,000.00	280,000.00
1949		140,000.00	140,000.00	280,000.00	280,000.00
1950		140,000.00	140,000.00	280,000.00	280,000.00
1951		140,000.00	140,000.00	280,000.00	280,000.00
1952		140,000.00	140,000.00	280,000.00	280,000.00
1953	$ 500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1954	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1955	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1956	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1957	2,000,000.00	80,000.00	40,000.00	120,000.00	2,120,000.00
1958	2,000,000.00	40,000.00		40,000.00	2,040,000.00
Total	$7,000,000.00	$3,970,000.00	$3,830,000.00	$7,800,000.00	$14,800,000.00

TABLE LXXXIII—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $77,000,000.00 OF THE $100,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Amount deposited in bond fund.	Accrued interest deposited in road fund.
1924	Dec. 30	97.557	4.29	$ 4,000,000.00	$ 3,913,411.20	$ 3,902,300.00	$ 11,111.20
1925	May 20	99.881	4.008	10,000,000.00	10,088,100.00	9,988,100.00	100,000.00
1925	Sept. 1	96.422	4.24	10,000,000.00	9,845,533.33	9,642,200.00	203,333.33
1926	Feb. 17	99.062	4.062	5,000,000.00	4,971,988.89	4,953,100.00	18,888.89
1927	April 26	101.601	3.895	6,000,000.00	6,099,286.67	6,096,100.00	3,186.67
1927	Oct. 11	101.016	3.93	6,000,000.00	6,076,800.00	6,061,000.00	15,800.00
1928	May 15	99.321	4.045	7,000,000.00	6,973,297.78	6,952,500.00	20,797.78
1928	July 17	96.266	4.225	13,000,000.00	12,556,488.89	12,514,600.00	41,888.89
1928	Sept. 18	97.255	4.185	9,000,000.00	8,784,000.00	8,753,000.00	31,000.00
1928	Nov. 8	97.55	4.15	7,000,000.00	6,842,500.00	6,828,500.00	14,000.00
Total		98.30	4.069	$77,000,000.00	$76,151,406.76	$75,691,400.00	$469,006.76

TABLE LXXXIV—APPROPRIATIONS PAYABLE FROM $100,000,000.00 BOND ISSUE FUND

Year.	For construction.	Amount lapsed October 1, 1925.	Amount lapsed October 1, 1927.
1923	$100,000,000.00	$96,000,000.00	
1925	96,000,000.00	Re-appropriation	$65,419,289.57
1927	60,000,000.00		Re-appropriation
Total	$256,000,000.00	$96,000,000.00	$65,419,289.57

TABLE LXXXV—EXPENDITURES FROM $100,000,000.00 BOND ISSUE FUND—1925 TO 1928.

Year.	Administration and engineering.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.	Additions and betterments.	Total.
1925	$1,911,411.30	$19,660,647.25	$28,385.40	$ 62,484.33	$21,662,928.28
1926	973,454.51	5,788,402.61	25,850.88	34,860.07	6,822,568.07
1927	1,156,027.51	10,492,365.61	19,680.83	75,877.38	11,743,951.33
1928	1,406,144.61	32,874,457.50	7,132.71	134,937.50	34,422,672.32
Total	$5,447,037.93	$68,815,872.97	$81,049.82	$308,159.28	$74,652,120.00

TABLE LXXXVI—STATEMENT SHOWING $100,000,000.00 BOND FUND BALANCES, RECEIPTS AND EXPENDITURES BY MONTHS FOR THE CALENDAR YEAR 1928.

Month.	Balance at beginning of month.	Receipts during month.	Per cent of total receipts.	Total.
January	$ 413,352.32			$ 413,352.32
February	44,885.10			44,885.10
March	57.19			57.19
April	57.19			57.19
May	57.19	$ 6,952,500.00	19.84	6,952,557.19
June	6,952,557.19			6,952,557.19
July	2,339,737.03	12,514,600.00	35.71	14,854,337.03
August	10,414,091.68			10,414,091.68
September	3,599,865.78	8,753,000.00	24.97	12,352,865.78
October	6,285,617.22			6,285,617.22
November	271,596.83	6,828,500.00	19.48	7,100,096.83
December	3,867,172.48			3,867,172.48
Total	$413,352.32	$35,048,600.00	100.00	$35,461,952.32

TABLE LXXXVI—Concluded.

Month.	Expenditures during month.	Per cent of total expenditures.	Balance at end of month.
January	$ 368,467.22	1.07	$ 44,885.10
February	44,827.91	.13	57.19
March			57.19
April			57.19
May			6,952,557.19
June	4,612,820.16	13.40	2,339,737.03
July	4,440,245.35	12.90	10,414,091.68
August	6,814,225.90	19.80	3,599,865.78
September	6,067,248.56	17.63	6,285,617.22
October	6,014,020.39	17.47	271,596.83
November	3,232,924.35	9.39	3,867,172.48
December	2,827,892.48	8.21	1,039,280.00
Total	$34,422,672.32	100.00	$1,039,280.00

TABLE LXXXVII—APPROPRIATIONS PAYABLE FROM GENERAL REVENUE FUND, AS MADE BY THE 54TH AND 55TH GENERAL ASSEMBLIES.

Year.	For construction of road from Banner to Copperas Creek Lock.		For construction of bridge at Pekin.		For construction of bridge at Carlyle, 55th G. A., H. B. 99	For construction of bridge at Hardin, 55th G. A., H. B. 112.
	54th G. A., H. B. 502.	55th G. A., S. B. 394.	54th G. A., H. B. 251.	55th G. A., S. B. 394.		
1925	$75,271.00		$400,000.00			
1927	Re-appropriation	$66,834.98	Re-appropriation	$400,000.00	$150,000.00	$400,000.00
Total	$75,271.00	$66,834.98	$400,000.00	$400,000.00	$150,000.00	$400,000.00

TABLE LXXXVII—Concluded.

Year.	For construction of Soldiers' Widows' Home road, 55th G. A., S. B. 33.	For construction of roads connecting bond issue routes, 55th G. A., S. B. 566.	For construction of road connecting Fort Massac with the State highway system, 55th G. A., S. B. 102.	For construction of drives and walks at Soldiers' and Sailors' Home, 55th G. A., H. B. 211.	Total.
1925					$ 475,271.00
1927	$25,000.00	$125,000.00	$30,000.00	$75,000.00	1,271,834.98
Total	$25,000.00	$125,000.00	$30,000.00	$75,000.00	$1,747,105.98

TABLE LXXXVIII—STATEMENT SHOWING EXPENDITURES FROM 55TH G. A. REVENUE FUND APPROPRIATIONS DURING THE CALENDAR YEAR 1928.

Month.	Banner to Copperas Creek road, re-appropriation, S. B. 394.	Soldiers' Widows' Home road, S. B. 33.	To connect roads with bond routes, S. B. 566.	Construction of drives and walks, H. B. 211.	Bridge at Pekin, re-appropriation, S. B. 394.	Total.
January	$ 587.79	$1,862.33				$ 2,450.12
February	587.79					587.79
March	1,371.51					1,371.51
April	587.79		$ 592.50			1,180.29
May	254.31			$ 7,534.23		7,788.54
June		3,005.02	2,718.94	30,066.22		35,790.18
July	3,015.84		12,059.52	19,066.54		34,141.90
August	4,180.56		7,371.00	3,164.50	$ 1,689.16	16,405.22
September	7,143.35		7,110.00	5,026.61	16,303.24	35,588.20
October			40,517.77		22,105.59	62,623.36
November			16,383.37		45,761.19	62,144.56
December	2,950.90		21,588.09	5,862.21	6,058.93	36,460.13
Total	$20,684.84	$4,867.35	$108,341.19	$70,720.31	$91,918.11	$296,531.80

TABLE LXXXIX—STATEMENT SHOWING REVENUE FUND RECEIPTS AND EXPENDITURES BY MONTHS FOR THE CALENDAR YEAR 1928.

Month.	Receipts during month.	Per cent of total receipts.	Expenditures during month.	Per cent of total expenditures.
January	$ 2,450.12	.83	$ 2,450.12	.83
February	587.79	.20	587.79	.20
March	1,371.51	.46	1,371.51	.46
April	1,180.29	.40	1,180.29	.40
May	7,788.54	2.63	7,788.54	2.63
June	35,790.18	12.07	35,790.18	12.07
July	34,141.90	11.51	34,141.90	11.51
August	16,405.22	5.53	16,405.22	5.53
September	35,588.20	12.00	35,588.20	12.00
October	62,623.36	21.12	62,623.36	21.12
November	62,144.56	20.96	62,144.56	20.96
December	36,460.13	12.29	36,460.13	12.29
Total	$296,531.80	100.00	$296,531.80	100.00

TABLE XC—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 766.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bond	$114,837.53	$114,837.53	
Boone	3,937.34		$ 3,937.34
Bureau	6,836.42		6,836.42
Cass	5,851.17		5,851.17
Champaign	74,453.33	22,629.13	51,824.20
Clark	126,259.34	126,258.68	.66
Clinton	6,745.00		6,745.00
Coles	36,876.16		36,876.16
Cook	687,935.42	498,954.97	188,980.45
Crawford	10,014.12		10,014.12
Cumberland	94,209.05	92,312.41	1,896.64
DeKalb	51,509.00	51,509.00	
Douglas	8,993.93		8,993.93
DuPage	82,042.00	82,042.00	
Edgar	1,577.20		1,577.20
Edwards	1,498.69		1,498.69
Effingham	106,181.45	98,590.35	7,591.10
Fayette	160,526.53	147,258.26	13,268.27
Fulton	28,585.10		28,585.10
Iroquois	65,788.51	65,788.39	.12
Jasper	3,350.74		3,357.40
Jefferson	4,168.35		4,168.35
Kane	113,639.55	113,639.55	
Kankakee	13,239.47	13,239.47	
Lake	143,681.62	143,681.62	
Lawrence	6,373.44		6,373.44
Lee	75,726.00	75,708.81	17.19
Livingston	13,119.87		13,119.87
Logan	3,058.65		3,058.65
Macoupin	73,176.31	17,495.88	55,680.43
Madison	206,032.34	174,200.20	31,832.14
Mason	55,882.46		55,882.46
Menard	51,117.01		51,117.01
Mercer	3,870.00		3,870.00
Monroe	7,035.04		7,035.04
Morgan	7,996.07		7,996.07
Ogle	47,816.63	12,597.86	35,218.77
Peoria	69,285.00	69,043.80	241.20
Piatt	21,027.69		21,027.69
Rock Island	4,650.54		4,650.54
St. Clair	84,210.92	84,210.92	
Sangamon	131,067.24	123,457.62	7,609.62
Schuyler	14,033.49		14,033.49
Stephenson	20,571.79		20,571.79
Tazewell	145,468.89	132,835.12	12,633.77
Vermilion	651,044.41	544,156.60	106,887.81
Warren	41,142.06	31,470.74	9,671.32
Whiteside	75,460.88	73,622.25	1,838.63
Will	21,521.00	16,600.68	4,920.32
Williamson	62,392.88		62,392.88
Winnebago	43,594.60	43,594.60	
Total	$3,889,382.23	$2,969,736.44	$919,645.79

TABLE XCI—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 867.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bureau	$ 6,055.66		$ 6,055.66
Carroll	15,090.56		15,090.56
Clinton	6,745.00		6,745.00
Coles	7,869.21		7,869.21
Cook	492,675.23	$ 18,268.01	474,407.22
DeKalb	60,841.26	3,450.76	57,390.50
Edgar	15,298.92		15,298.92
Franklin	10,493.36		10,493.36
Fulton	8,030.00		8,030.00
Grundy	75,252.00	50,000.00	25,252.00
Jackson	5,909.92		5,909.92
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	84,480.35	72,448.07	12,032.28
Kankakee	62,881.21	62,881.21	
Lake	388,961.15	337,156.27	51,804.88
LaSalle	114,736.57		114,736.57
Lawrence	19,757.21		19,757.21
Lee	25,004.86		25,004.86
Livingston	13,912.26		13,912.26
McHenry	10,647.17		10,647.17
Macoupin	127,876.00		127,876.00
Madison	389,115.77	234,129.24	154,986.53
Marshall	4,307.27		4,307.27
Menard	58,894.30	25,000.00	33,894.30
Ogle	26,288.20		26,288.20
Peoria	170,329.32		170,329.32
Rock Island	15,558.05		15,558.05
St. Clair	133,153.61	118,506.05	14,647.56
Sangamon	164,639.00	156,009.58	8,629.42
Shelby	18,573.03		18,573.03
Whiteside	4,732.04		4,732.04
Will	183,290.57	165,712.27	17,578.30
Winnebago	124,196.40	70,323.39	53,873.01
Total	$2,869,289.87	$1,313,884.85	$1,555,405.02

TABLE XCII—STATEMENT SHOWING TOTAL REFUNDS TO MUNICIPALITIES FROM JULY 1, 1927, TO DECEMBER 31, 1928.

Route.	City.	Amount.
37	Benton	$31,213.95
4	Bloomington	6,612.48
2	Carbondale	5,896.08
13	Carbondale	8,684.69
4	Carlinville	5,734.70
10	Champaign	11,710.61
16	Charleston	11,532.06
11	Effingham	9,944.24
25	Effingham	2,464.63
11	Greenville	25,936.36
10	Jacksonville	4,837.39
37	Johnston City	21,915.36
28	Kewanee	47,495.25
4	Normal	14,000.38
2	Oglesby	12,116.96
2	Pana	22,213.74
6	Rochelle	24,970.41
27	Savanna	2,230.50
25	Urbana	5,470.56
2	Vandalia	23,654.05
11	Vandalia	2,024.85
	Total	$300,659.25

TABLE XCIII—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 822.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1925.
Adams	$ 16,256.06	-----	$ 16,256.06
Bond	4,438.92	$ 4,438.02	-----
Boone	3,762.32	3,762.32	-----
Bureau	12,894.26	12,854.54	39.72
Carroll	10,024.77	6,551.10	3,473.67
Cass	5,851.17	-----	5,851.17
Champaign	51,746.58	48,535.18	3,211.40
Coles	33,738.22	32,480.92	1,257.30
Cook	984,393.21	720,389.28	264,003.93
Cumberland	6,261.78	-----	6,261.78
DeKalb	58,192.39	23,381.70	34,810.69
DuPage	45,207.17	40,858.47	4,348.70
Edgar	16,876.12	14,148.08	2,728.04
Edwards	1,498.69	-----	1,498.69
Effingham	5,656.37	3,918.26	1,738.11
Ford	5,738.29	-----	5,738.29
Fulton	33,123.80	32,540.30	583.50
Grundy	55,734.87	30,734.87	25,000.00
Iroquois	18,843.00	-----	18,843.00
Jersey	2,930.72	-----	2,930.72
Kane	393,922.37	165,972.21	227,950.16
Kankakee	21,044.78	17,968.30	3,076.48
LaSalle	27,281.15	-----	27,281.15
Lake	214,144.81	85,625.17	128,519.64
Lee	25,004.86	25,004.86	-----
Livingston	19,160.77	19,160.77	-----
Logan	1,166.42	-----	1,166.42
Macon	1,618.85	-----	1,618.85
Macoupin	162,902.24	162,406.36	495.88
Madison	302,991.28	172,847.39	130,143.89
Marion	1,593.66	-----	1,593.66
Marshall	45,601.86	-----	45,601.86
Mason	54,066.22	54,066.22	-----
McHenry	10,191.63	-----	10,191.63
Menard	44,773.74	26,242.44	18,531.30
Mercer	3,870.00	-----	3,870.00
Monroe	7,035.04	1,000.00	6,035.04
Morgan	7,966.07	-----	7,966.07
Ogle	78,613.10	64,767.39	13,845.71
Peoria	122,739.77	80,818.16	41,921.61
Piatt	11,235.62	11,235.62	-----
Pike	8,325.16	-----	8,325.16
Putnam	19,073.92	7,000.00	12,073.92
Rock Island	3,029.82	-----	3,029.82
Schuyler	17,583.40	6,929.94	10,653.46
Shelby	17,366.56	-----	17,366.56
St. Clair	483,564.11	483,339.78	224.33
Stephenson	12,838.53	12,838.53	-----
Tazewell	12,633.48	-----	12,633.48
Vermilion	155,526.79	-----	155,526.79
Warren	38,405.66	-----	38,405.66
Whiteside	4,732.04	4,732.04	-----
Will	194,128.06	100,340.09	93,787.97
Williamson	66,863.40	55,169.70	11,693.70
Winnebago	61,468.68	61,468.68	-----
Total	$4,025,632.56	$2,593,527.59	$1,432,104.97

TABLE XCIV—STATEMENT SHOWING AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, SENATE BILL 515.

County.	Amount appropriated.	Amounts refunded.	Balance December 31, 1927.
Adams	$ 16,256.07		$ 16,256.07
Carroll	4,000.00	$ 3,145.84	854.16
Cass	3,450.54	3,450.54	
Coles	1,888.97	1,888.97	
Cook	505,985.35		505,985.35
Douglas	2,949.33	2,949.33	
Edwards	1,498.69	1,498.69	
Effingham	6,297.35	5,058.90	1,238.45
Ford	5,738.29		5,738.29
Fulton	32,540.30		32,540.30
Iroquois	7,498.00	7,498.00	
Jackson	942.00		942.00
Jefferson	1,125.28		1,125.28
Jersey	2,930.72	1,836.64	1,094.08
JoDaviess	20,763.69		20,763.69
Kane	248,924.77	180,296.18	68,628.59
Kankakee	147,419.17	147,419.17	
Lake	50,000.00	41,625.86	8,374.14
LaSalle	21,566.89		21,566.89
Lee	25,004.86		25,004.86
Livingston	26,445.09	7,421.01	19,024.08
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Madison	23,054.63	22,463.23	591.40
Marion	1,895.40		1,895.40
Marshall	45,598.82		45,598.82
Mason	63,814.17		63,814.17
McHenry	10,161.59	10,161.59	
McLean	47,356.52		47,356.52
Menard	3,531.30		3,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.03	6,035.03	1,000.00
Morgan	7,966.07	7,966.07	
Peoria	46,529.39	44,467.72	2,061.67
Piatt	11,235.62		11,235.62
Pike	8,066.39		8,066.39
Putnam	19,073.92	12,000.00	7,073.92
Rock Island	2,746.47	2,746.47	
Sangamon	572,109.87		572,109.87
Schuyler	25,802.02	2,845.86	22,956.16
Shelby	17,554.03	17,554.03	
St. Clair	449,998.24	284,477.40	165,520.84
Stephenson	7,726.37		7,726.37
Tazewell	12,633.48	12,633.48	
Vermilion	19,500.00		19,500.00
Will	109,415.59	109,415.59	
Williamson	52,133.40		52,133.40
Total	$2,704,818.95	$936,855.60	$1,767,963.35

TABLE XCV—STATEMENT SHOWING AMOUNTS REFUNDED TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM FROM APPROPRIATION OF $3,000,000.00, S. B. 395, AVAILABLE JULY 1, 1927.

Lump sum appropriation available July 1, 1927		$3,000,000.00
Less—Refunds to counties:		
County—		
Champaign	$ 10,734.95	
Douglas	65,251.58	
Fulton	68,919.63	
Grundy	39,266.58	
Iroquois	37,292.12	
Kane	433,812.10	
Kankakee	20,973.12	
LaSalle	21,529.05	
McLean	47,276.88	
Peoria	110,941.86	
Pike	8,066.39	
Sangamon	289,000.00	
Schuyler	1,128.99	
St. Clair	354,770.18	
Williamson	43,600.87	
		1,552,564.30
Balance in appropriation, December 31, 1928		$1,447,435.70

TABLE XCVI—STATEMENT SHOWING THE AMOUNTS REFUNDED TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATEBOND ISSUE SYSTEM TO DECEMBER 31, 1928.

County.	52d G. A. House Bill 766.	52d G. A. House Bill 867.	53d G. A. House Bill 822.	54th G. A. Senate Bill 515.	55th G. A. Senate Bill 395.	Total.
Bond	$114,837.53		$ 4,438.92			$ 119,276.45
Boone			3,762.32			3,762.32
Bureau			12,854.54			12,854.54
Carroll			6,551.10	$ 3,145.84		9,696.94
Cass				3,450.54		3,450.54
Champaign	22,629.13		48,535.18		$ 10,734.95	81,899.26
Clark	126,258.68					126,258.68
Coles			32,480.92	1,888.97		34,369.89
Cook	498,954.97	$ 18,268.01	720,389.28			1,237,612.26
Cumberland	92,312.41					92,312.41
DeKalb	51,509.00	3,450.76	23,381.70			78,341.46
Douglas				2,949.33	65,251.58	68,200.91
DuPage	82,042.00		40,858.47			122,900.47
Edgar			14,148.08			14,148.08
Edwards				1,498.69		1,498.69
Effingham	98,590.35		3,918.26	5,058.90		107,567.51
Fayette	147,258.26					147,258.26
Fulton			32,540.30		68,919.63	101,459.93
Grundy		50,000.00	30,734.87		39,266.58	120,001.45
Iroquois	65,788.39			7,498.00	37,292.12	110,578.51
Jersey				1,836.64		1,836.64
Kane	113,639.55	72,448.07	165,972.21	180,296.18	433,812.10	966,168.11
Kankakee	13,239.47	62,881.21	17,968.30	147,419.17	20,973.12	262,481.27
Lake	143,681.62	337,156.27	85,625.17	41,625.86		608,088.92
LaSalle					21,529.05	21,529.05
Lee	75,708.81		25,004.86			100,713.67
Livingston			19,160.77	7,421.01		26,581.78
Macoupin	17,495.88		162,406.36			179,902.24
Madison	174,200.20	234,129.24	172,847.39	22,463.23		603,640.06
Mason			54,066.22			54,066.22
McHenry				10,161.59		10,161.59
McLean					47,276.88	47,276.88
Menard		25,000.00	26,242.44			51,242.44
Monroe			1,000.00	6,035.03		7,035.03
Morgan				7,966.07		7,966.07
Ogle	12,597.86		64,767.39			77,365.25
Peoria	69,043.80		80,818.16	44,467.72	110,941.86	305,271.54
Piatt			11,235.62			11,235.62
Pike					8,066.39	8,066.39
Putnam			7,000.00	12,000.00		19,000.00
Rock Island				2,746.47		2,746.47
St. Clair	84,210.92	118,506.05	483,339.78	284,477.40	354,770.18	1,325,304.33
Sangamon	123,457.62	156,009.58			289,000.00	568,467.20
Schuyler			6,929.94	2,845.86	1,128.99	10,904.79
Shelby				17,554.03		17,554.03
Stephenson			12,838.53			12,838.53
Tazewell	132,835.12			12,633.48		145,468.60
Vermilion	544,156.60					544,156.60
Warren	31,470.74					31,470.74
Whiteside	73,622.25		4,732.04			78,354.29
Will	16,600.68	165,712.27	100,340.09	109,415.59		392,068.63
Williamson			55,169.70		43,609.87	98,770.57
Winnebago	43,594.60	70,323.39	61,468.68			175,386.67
Grand total	$2,969,736.44	$1,313,884.85	$2,593,527.59	$936,855.60	$1,552,564.30	$9,336,568.78

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VIII. ILLUSTRATIONS.

For a ready reference to the text matter for the following figures, see "Illustrations" on page xi.

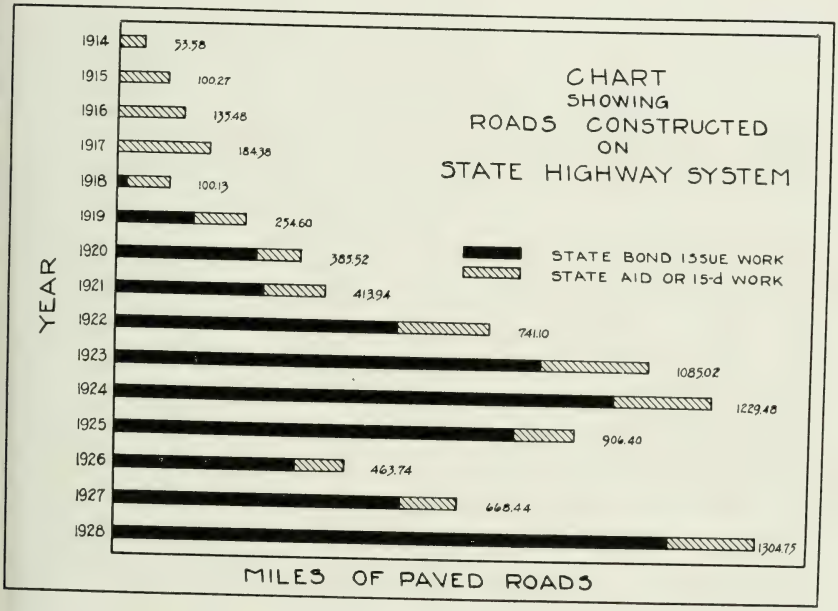
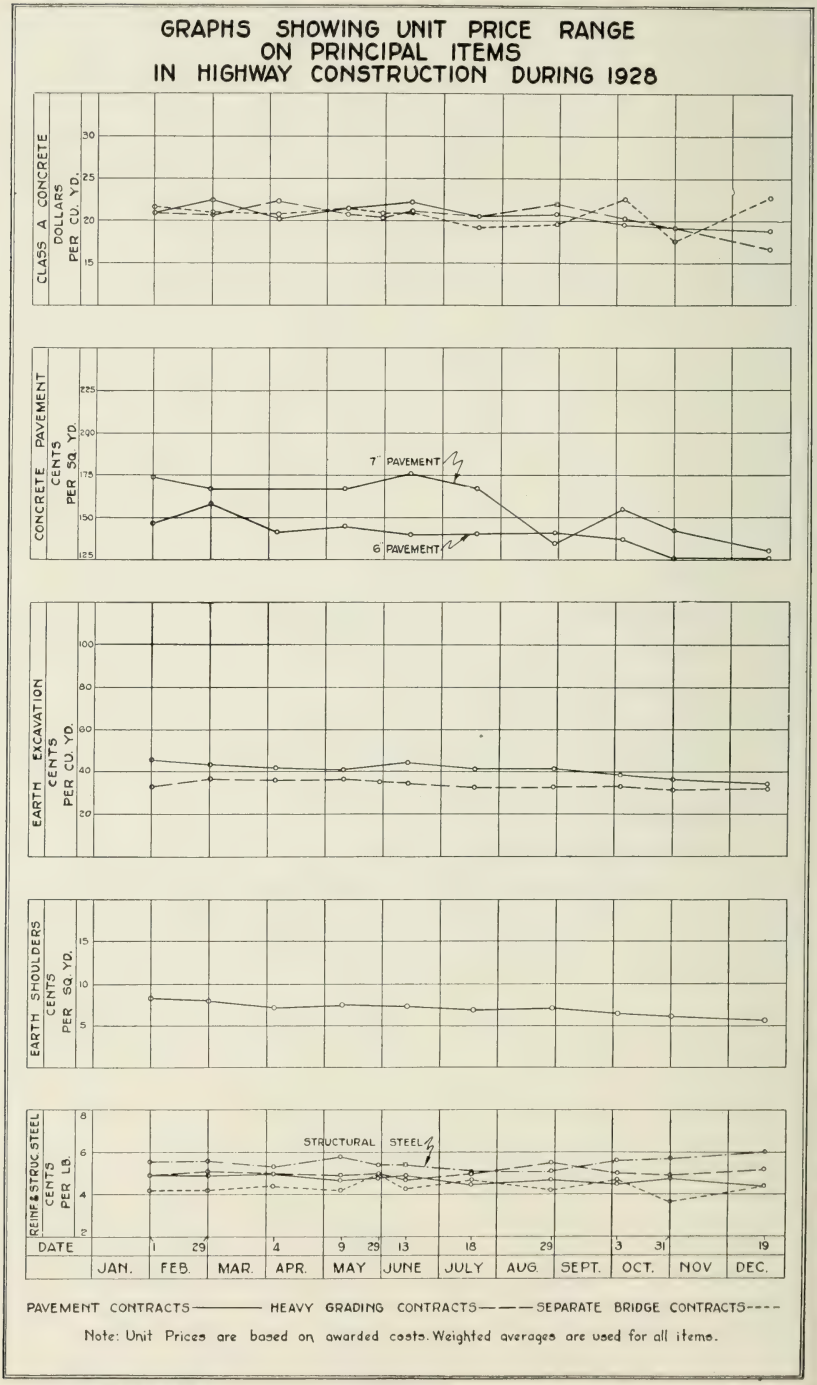


Figure 1.



Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 2.

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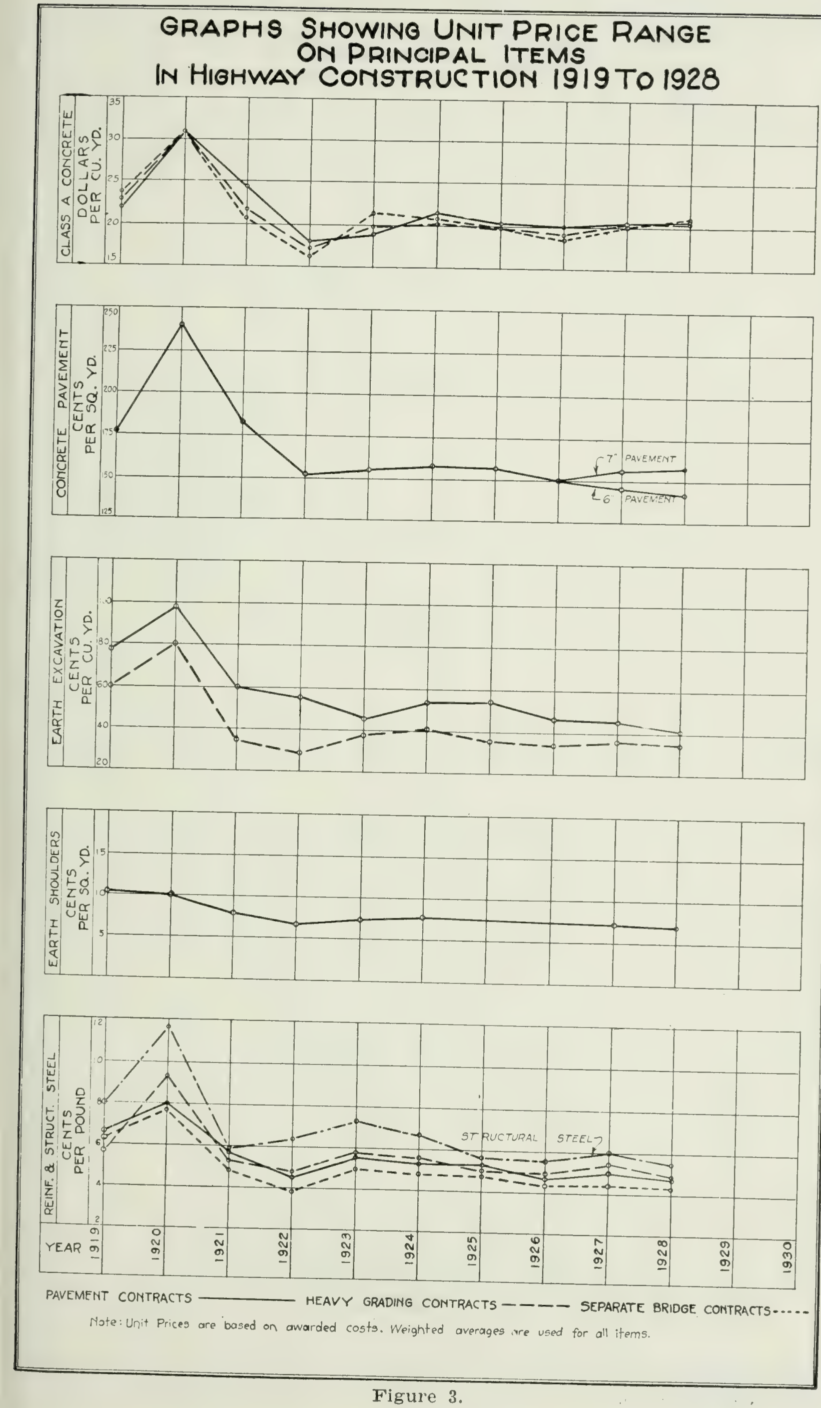

Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.

Figure 3.

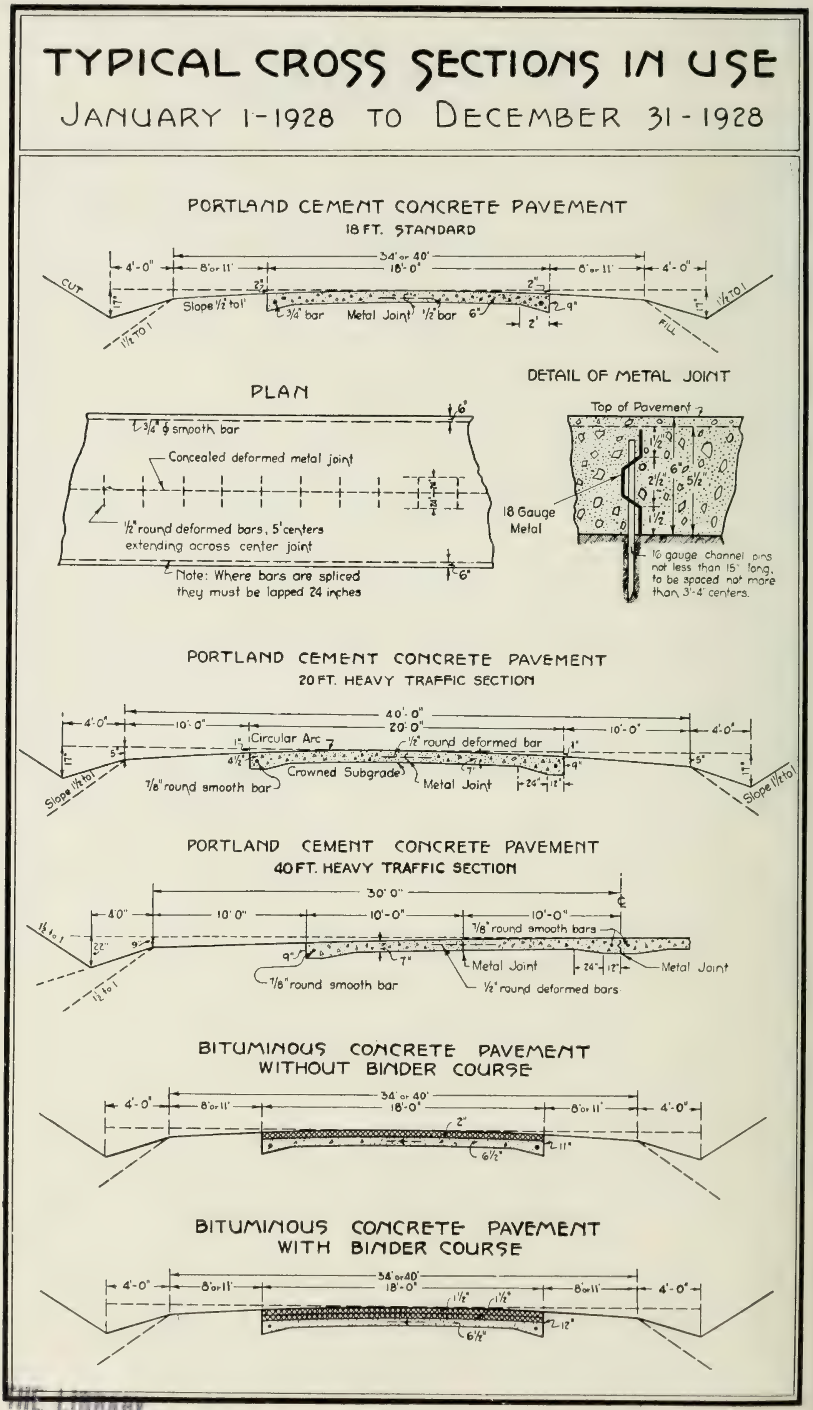

Figure 4.

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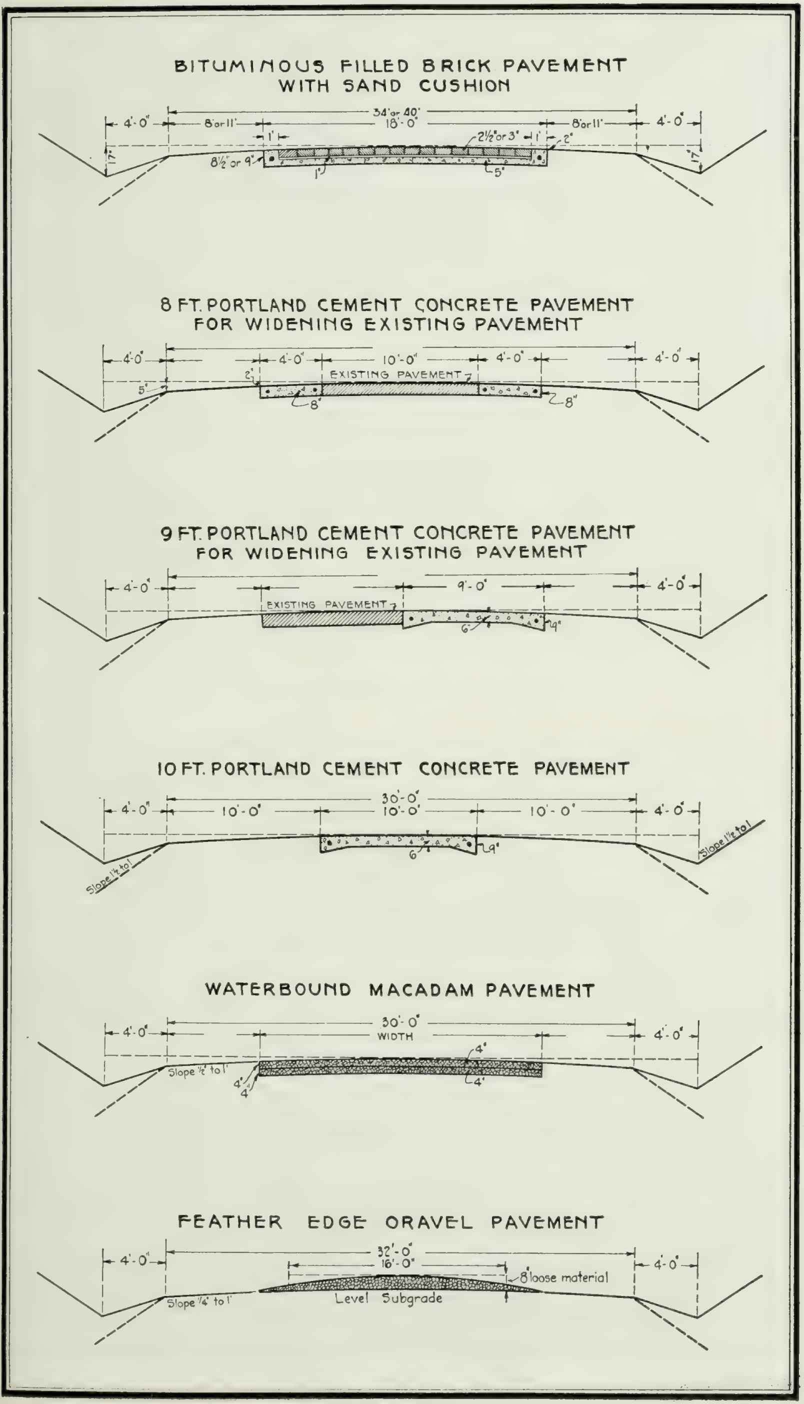
BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION
4'-0"
8' or 11'
34' or 40'
18'-0"
8' or 11'
4'-0"
1'
2½" or 3'
1'
2"
17"
8½" or 9"
1"
5"
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
4'-0"
4'-0"
10'-0"
4'-0"
4'-0"
2"
5"
EXISTING PAVEMENT
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
4'-0"
9'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
4'-0"
10'-0"
30'-0"
10'-0"
10'-0"
4'-0"
6"
9"
Slope 1½ to 1
Slope 1½ to 1
WATERBOUND MACADAM PAVEMENT
4'-0"
30'-0"
WIDTH
4'-0"
Slope ½ to 1
4"
4"
4"
4"
FEATHER EDGE GRAVEL PAVEMENT
4'-0"
32'-0"
16'-0"
4'-0"
8" loose material
Slope ¼ to 1
Level Subgrade

Figure 5.

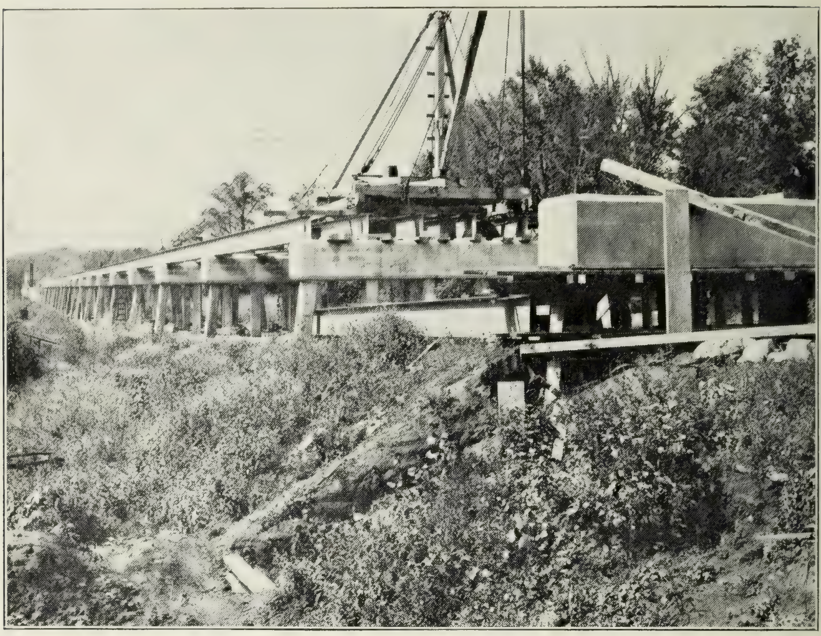

Figure 6.—East approach to the bridge over the Illinois River at Florence.

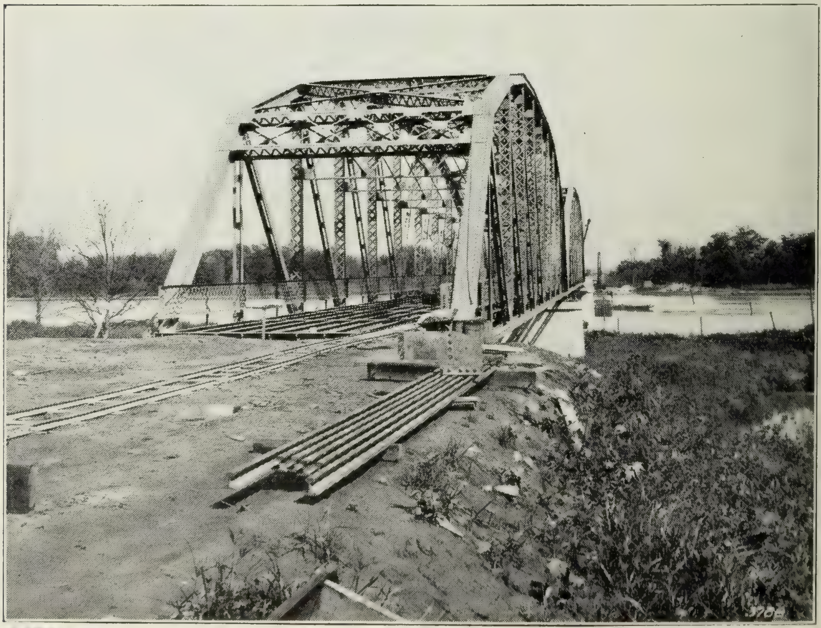

Figure 7.—Illinois River bridge at Florence. Construction view taken in September, 1928.

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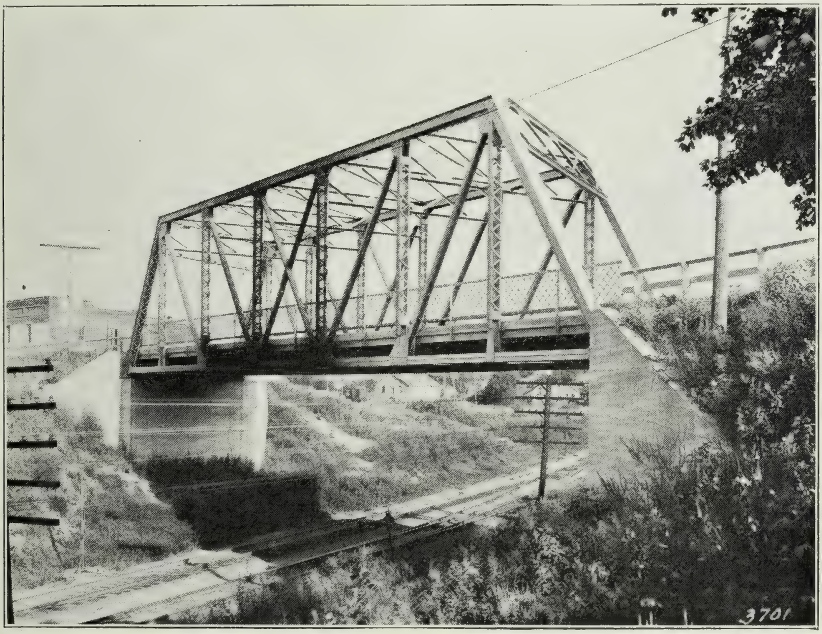

Figure 8.—Grade separation structure over Illinois Central Railroad at Cobden.

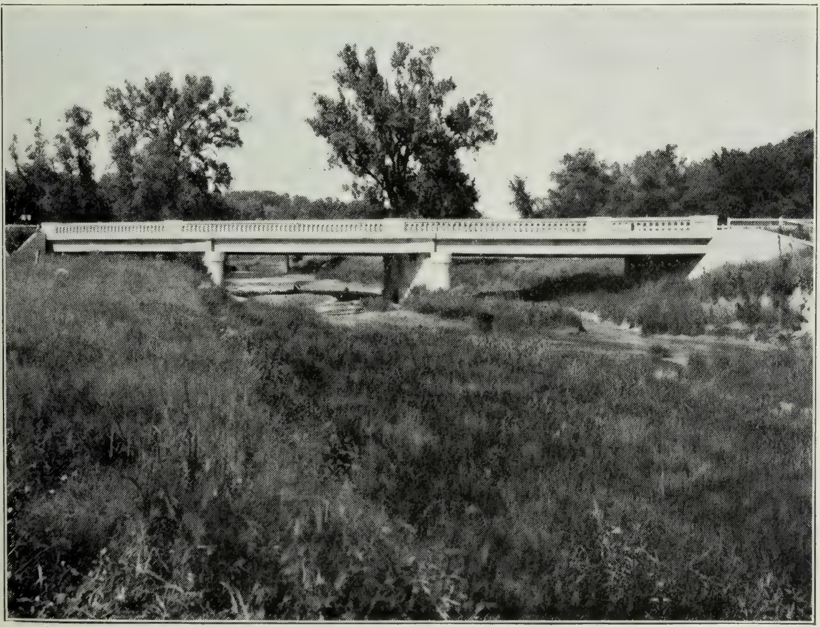

Figure 9.—Deck girder bridge over Smallpox Creek in JoDaviess County.

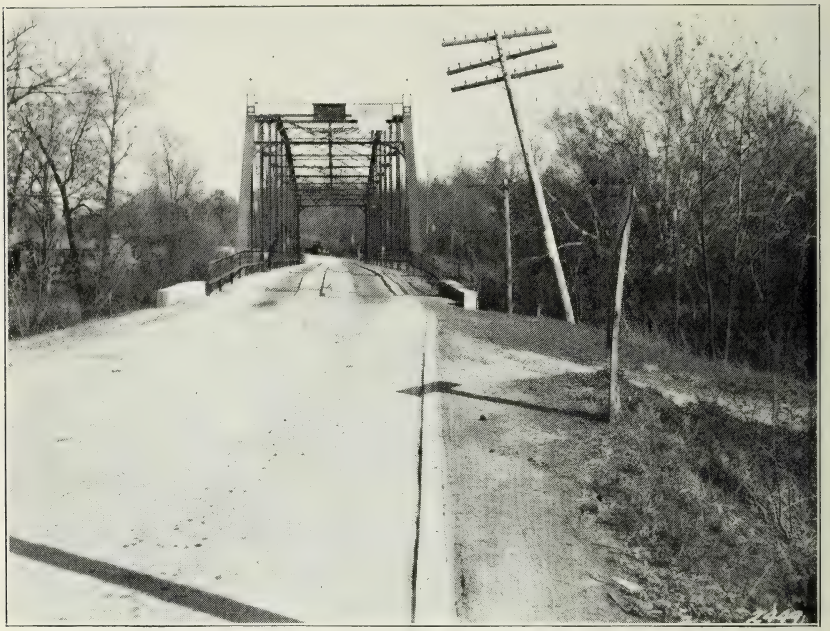

Figure 10.—The old bridge over the Big Muddy River east of Murphysboro.

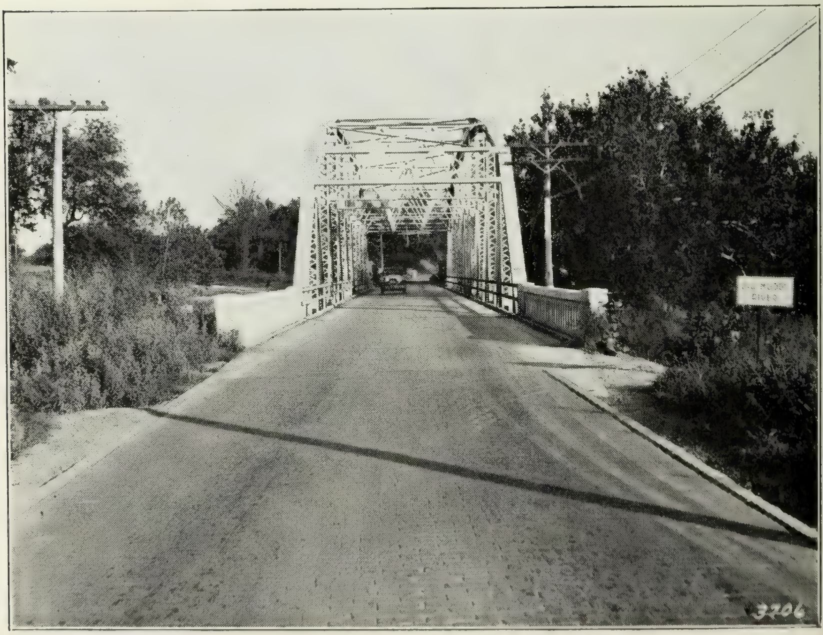

Figure 11.—The new bridge over the Big Muddy River east of Murphysboro.

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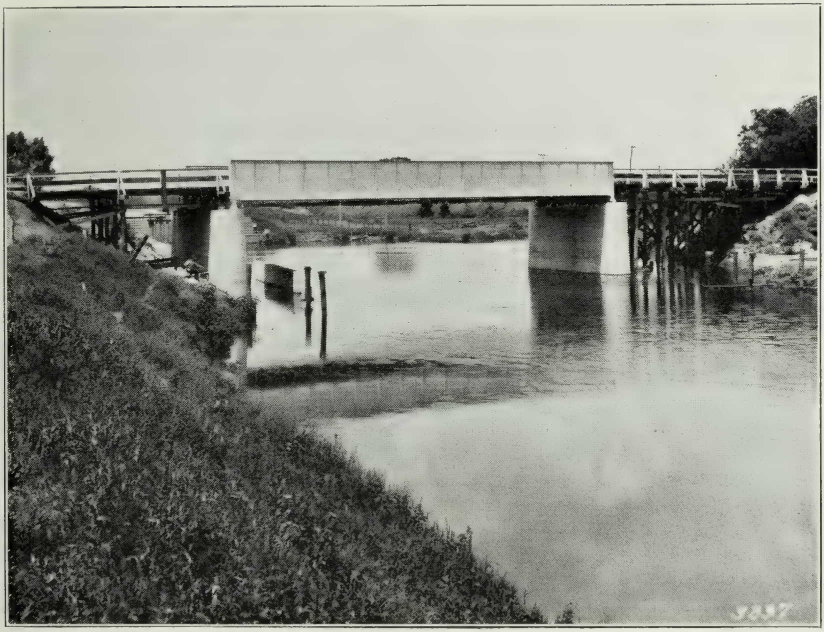

Figure 12.—Plate girder span over Hennepin Canal at Bureau.

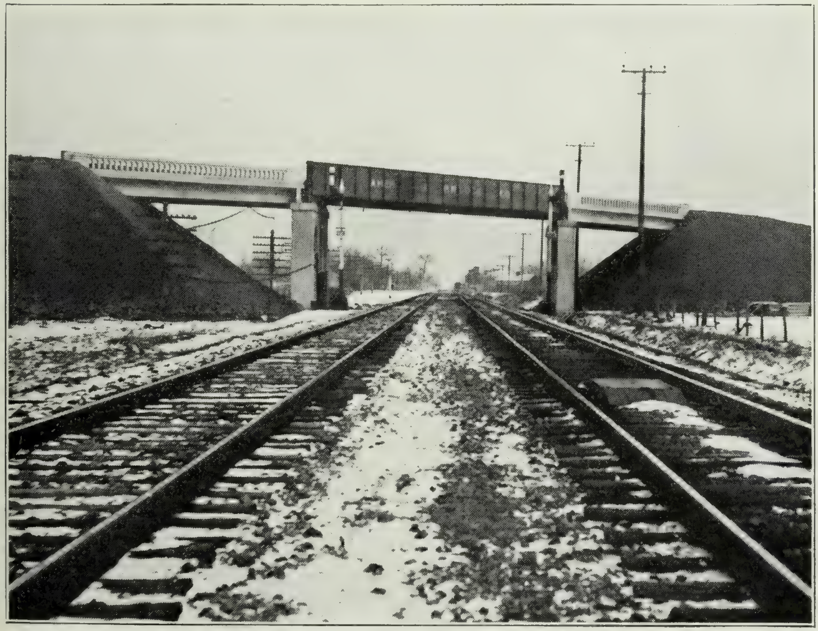

Figure 13.—Grade separation structure over Chicago and Alton Railroad at Gardner.

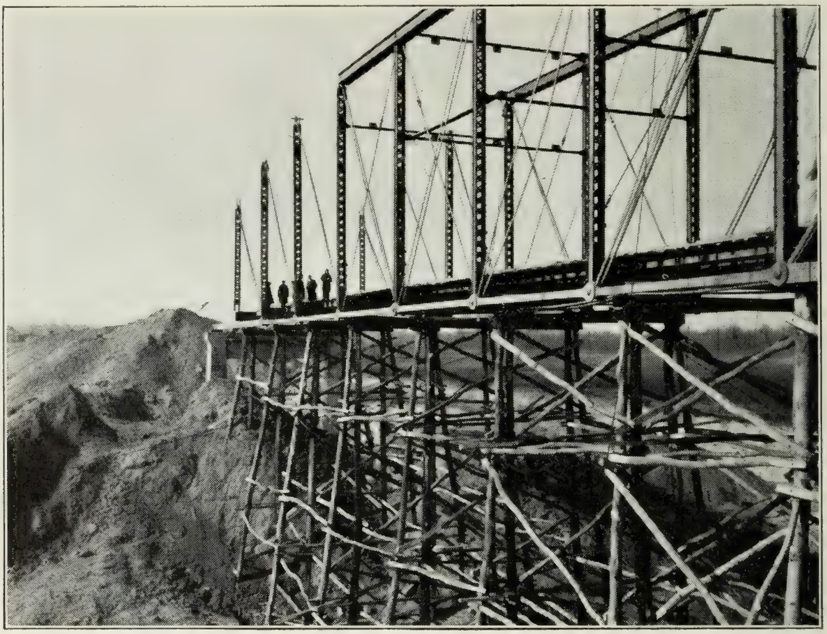

Figure 14.—Erecting steel for 200 foot span over Big Bay Creek at Elizabethtown.

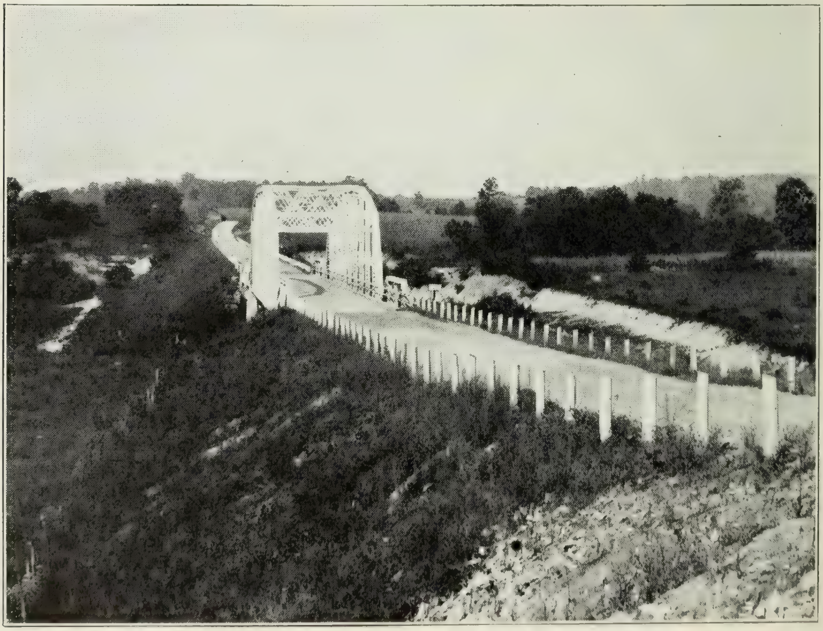

Figure 15.—Bridge over Big Bay Creek at Elizabethtown.

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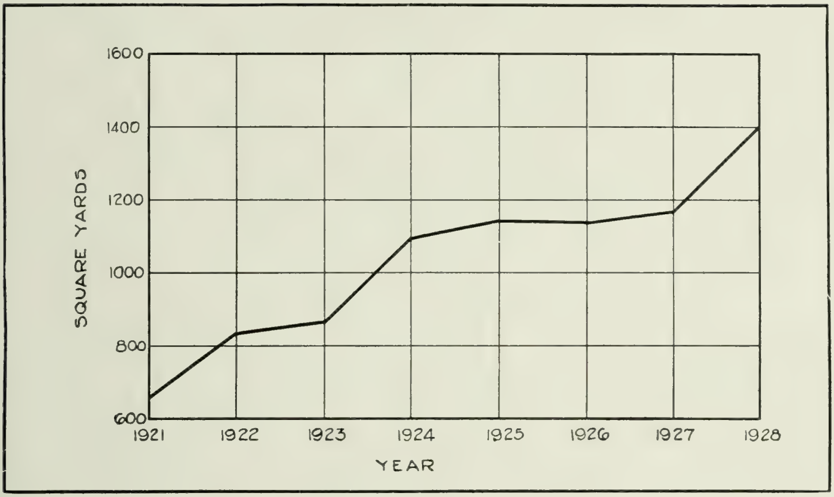
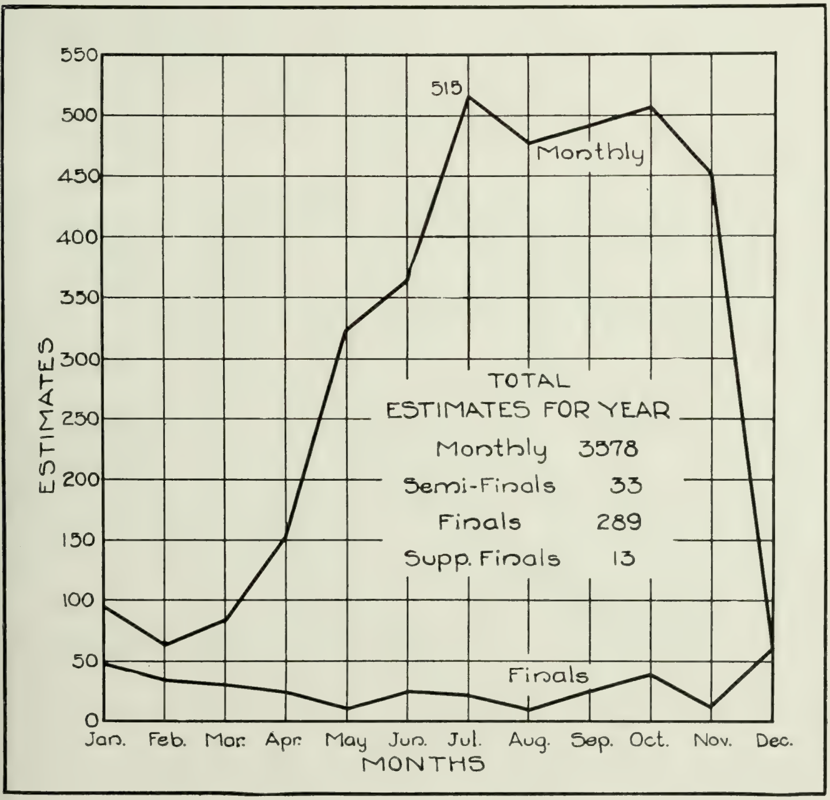


FIGURE 16.—Curve showing average daily output of concrete in square yards from 1921 to 1928, inclusive.



TOTAL ESTIMATES FOR YEAR	
Monthly	3578
Semi-Finals	33
Finals	289
Supp. Finals	13

Figure 17.—Curves showing monthly output of payment estimates, 1928.

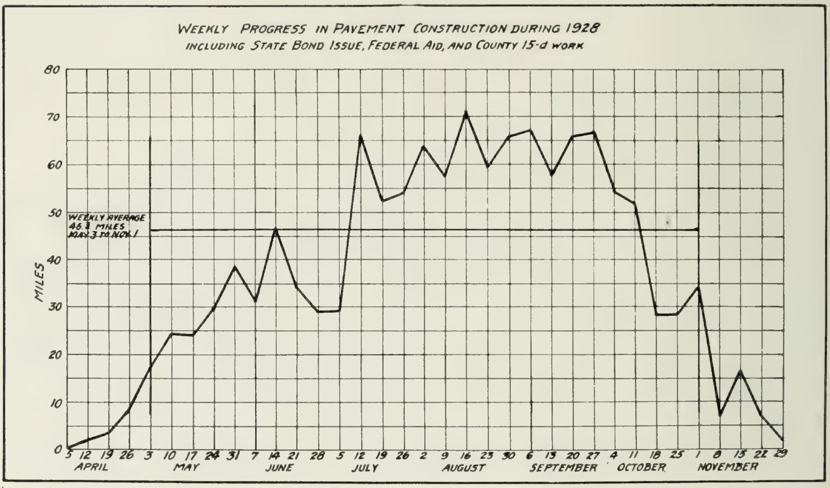


Figure 18.

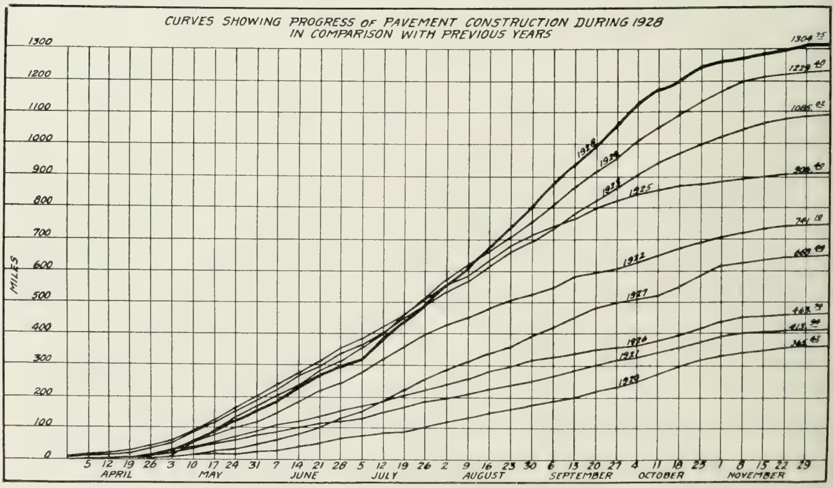


Figure 19.

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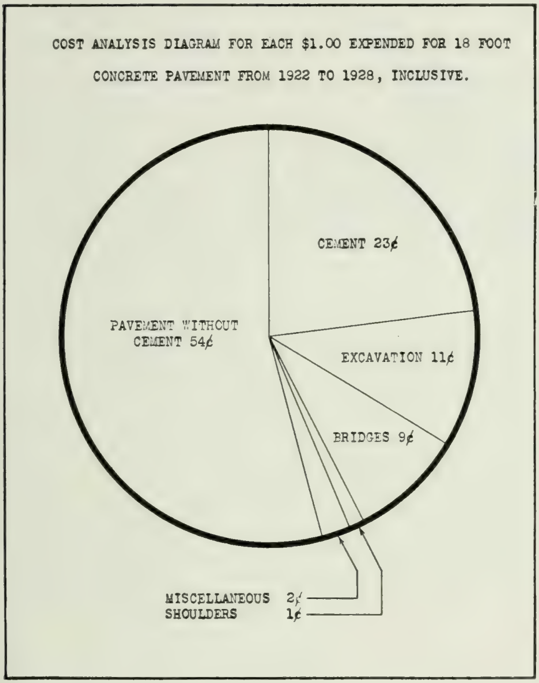
COST ANALYSIS DIAGRAM FOR EACH $1.00 EXPENDED FOR 18 FOOT CONCRETE PAVEMENT FROM 1922 TO 1928, INCLUSIVE.

Figure 20.

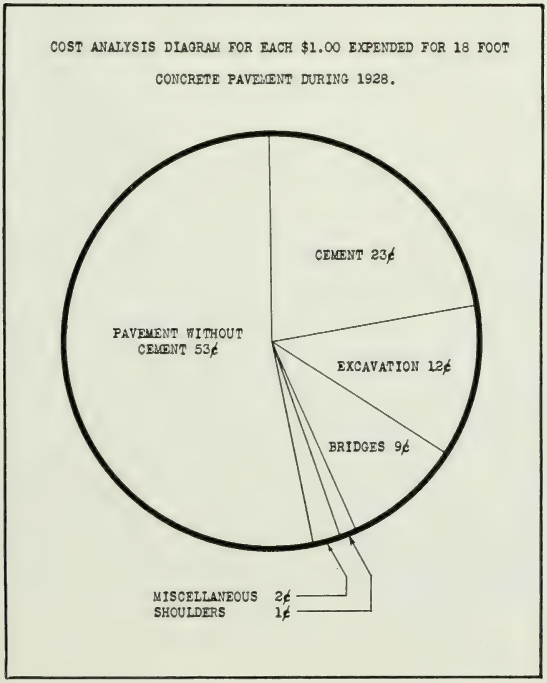
COST ANALYSIS DIAGRAM FOR EACH $1.00 EXPENDED FOR 18 FOOT CONCRETE PAVEMENT DURING 1928.

Figure 21.

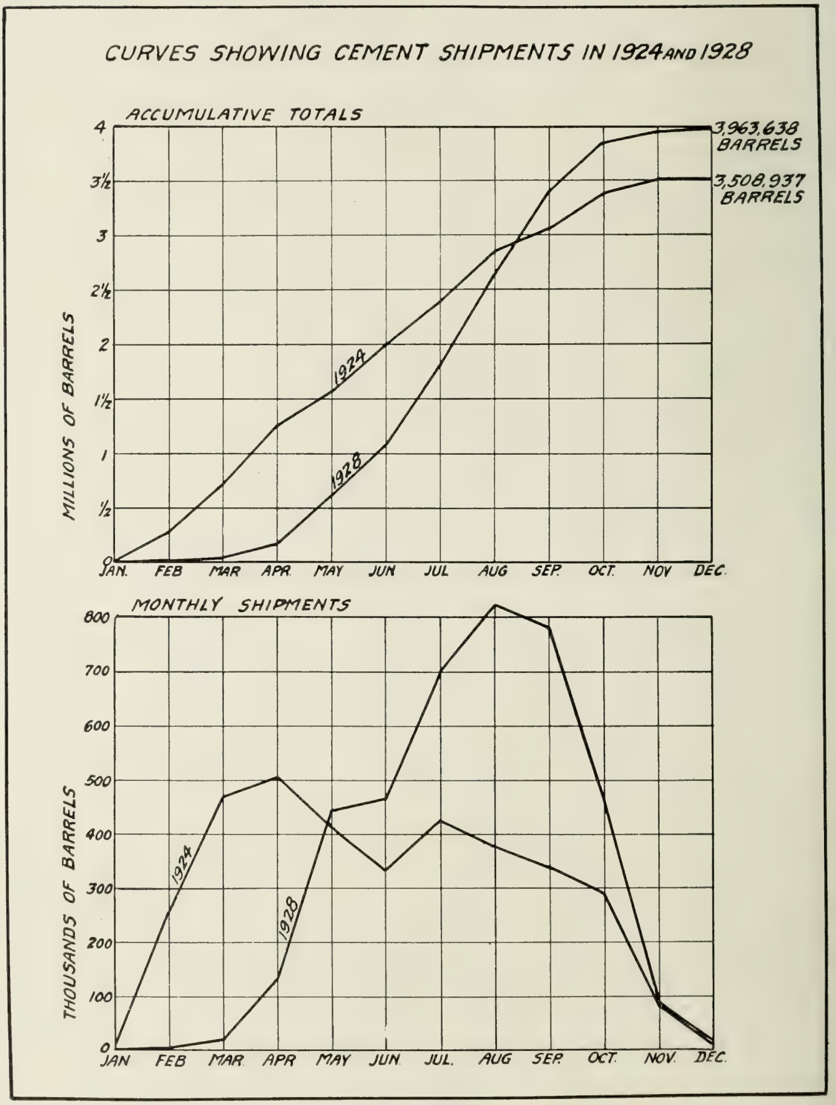

Figure 22.

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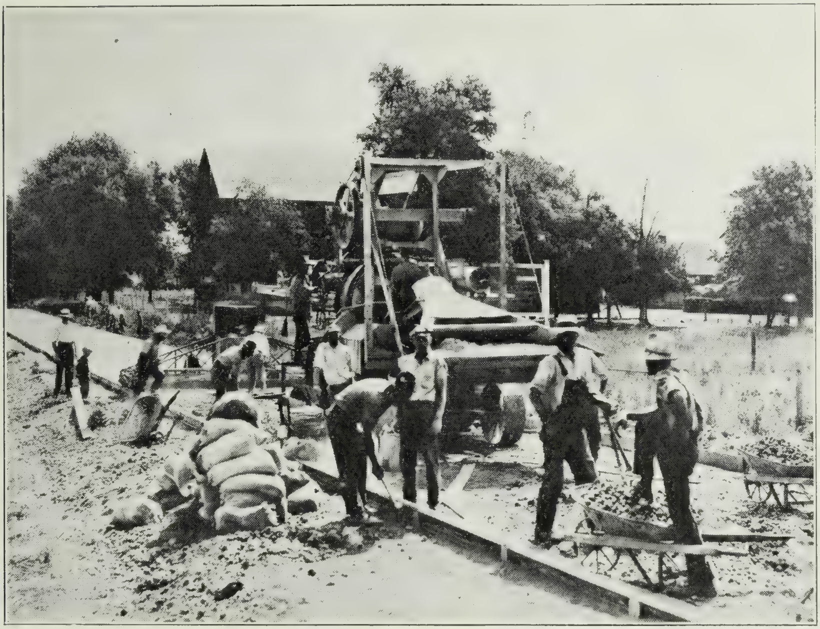

Figure 23.—A typical paving unit of ten years ago.

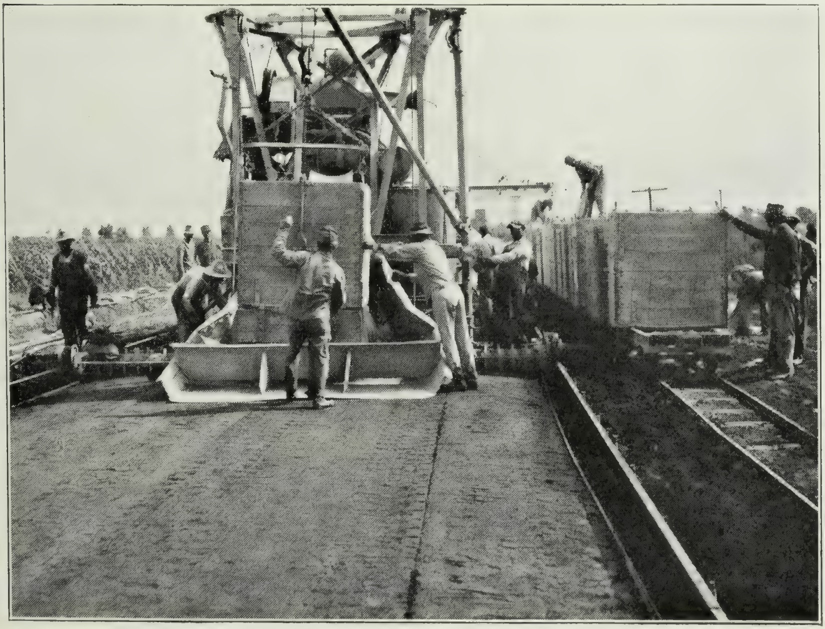

Figure 24. A modern paving outfit.

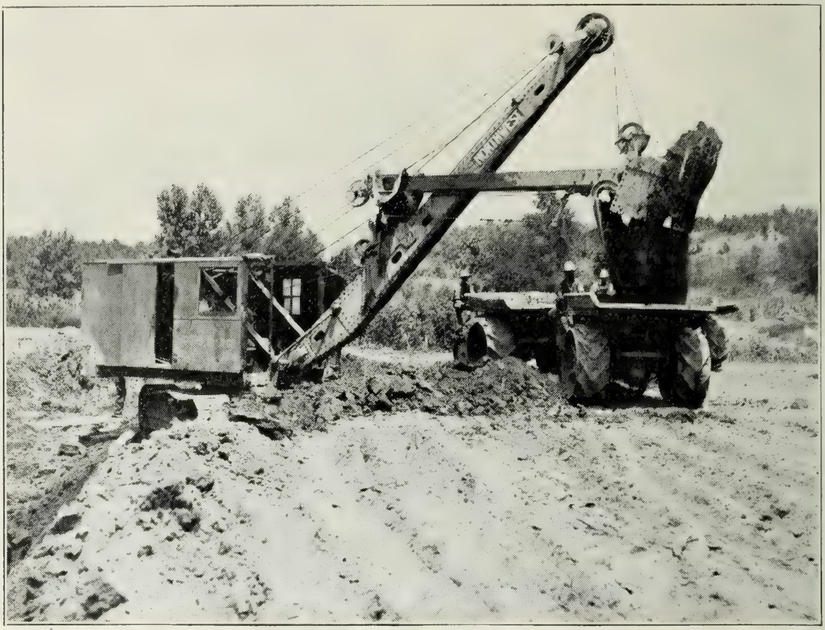

Figure 25.—A modern earth moving outfit.

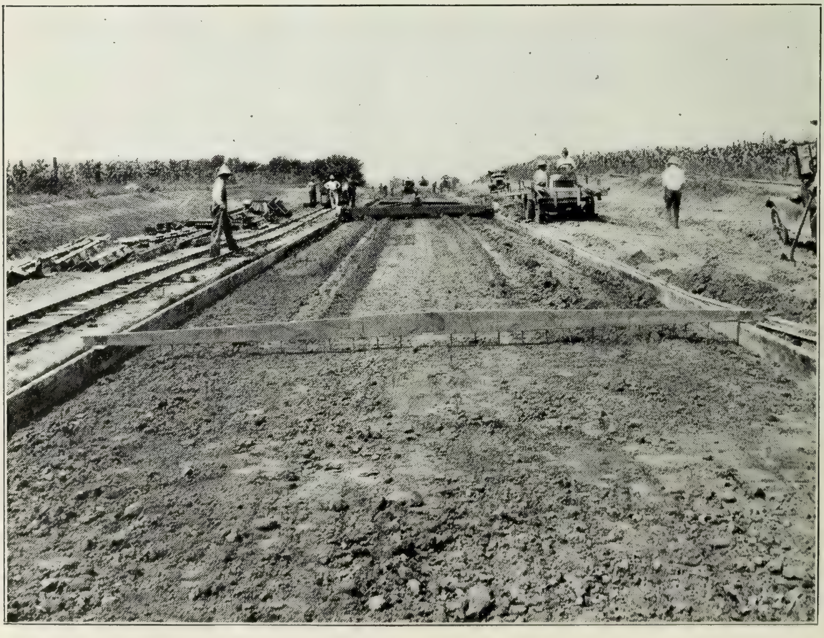

Figure 26.—Trimming subgrade and testing it for correct depth.

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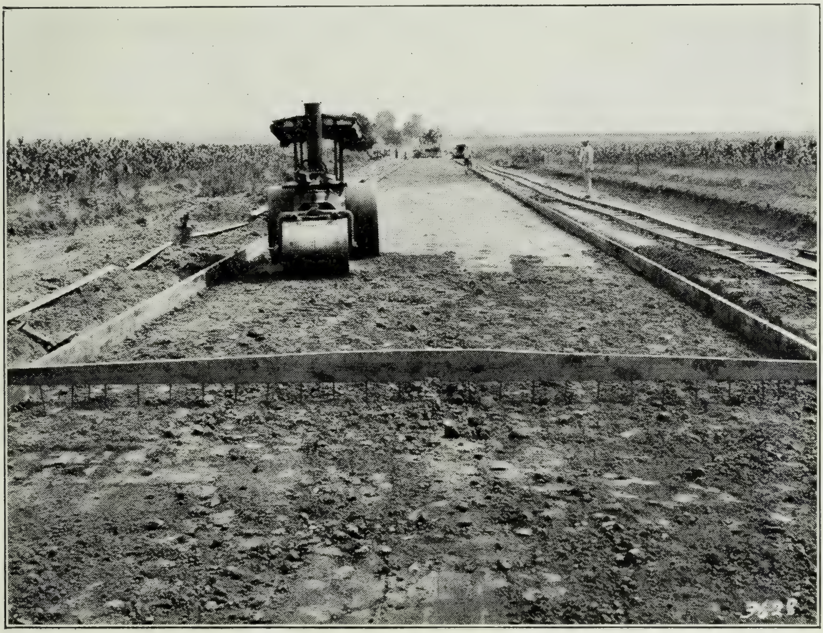

Figure 27.—Smoothing and compacting subgrade in front of the mixer.

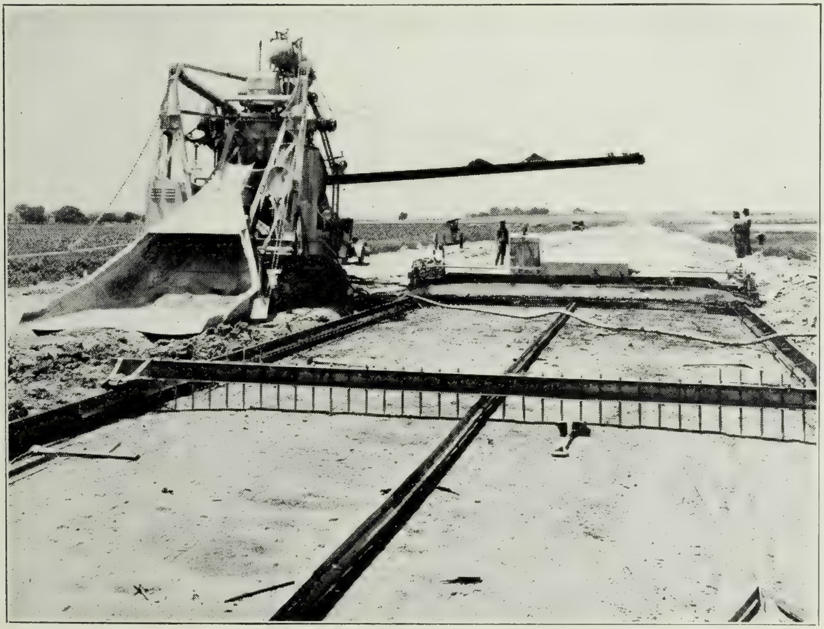

Figure 28.—Constructing first half of 40-foot pavement.

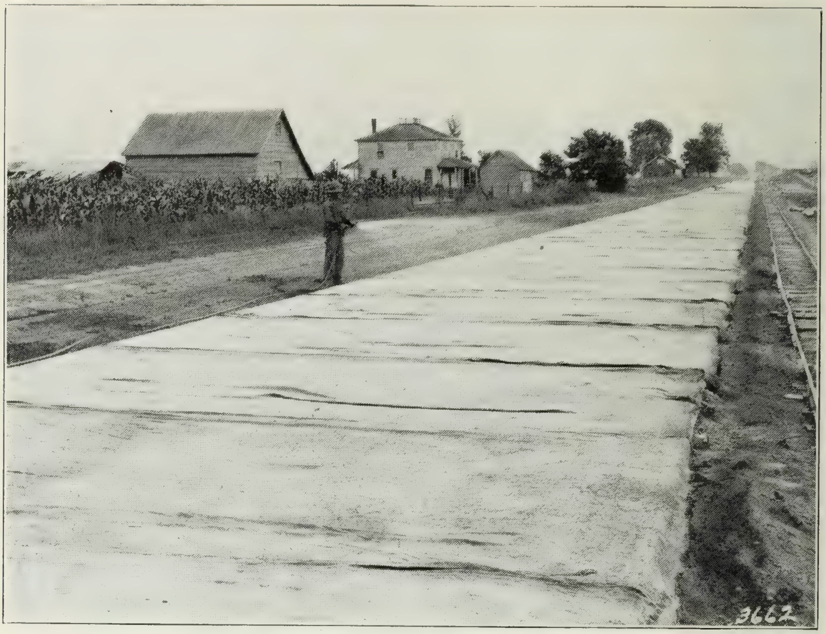

Figure 29.—Wetting burlap placed over pavement immediately back of the mixer.

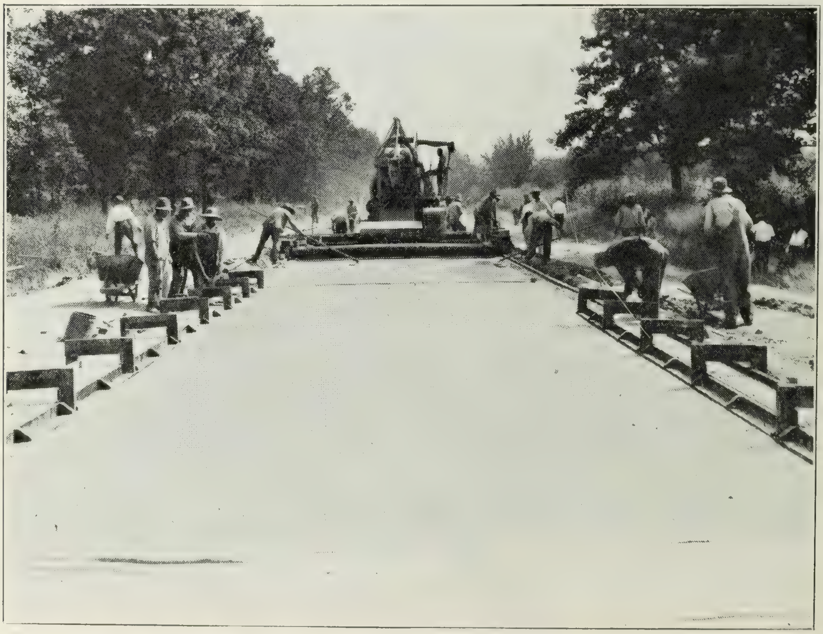

Figure 30.—Constructing concrete base and curb for a brick pavement.

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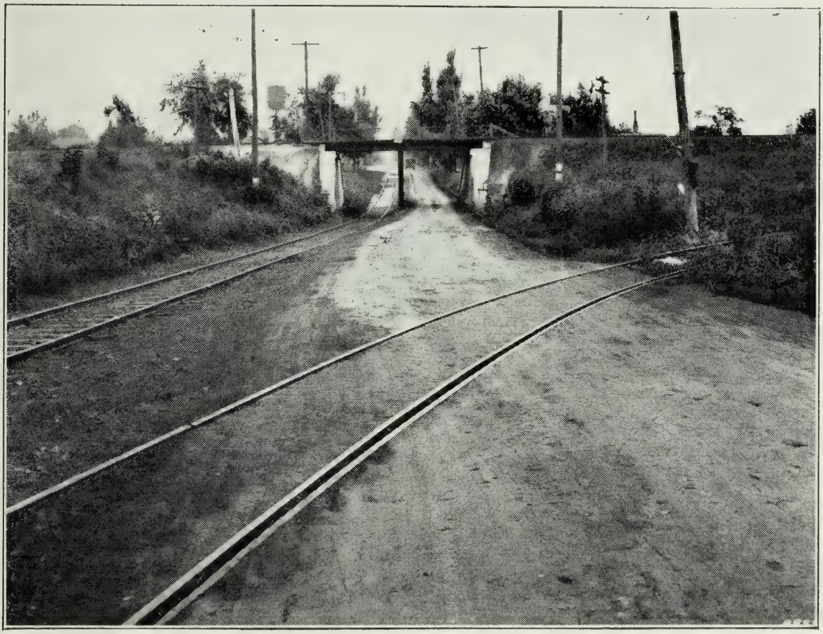

Figure 31.—The old subway under the Pennsylvania Railroad at Maroa.

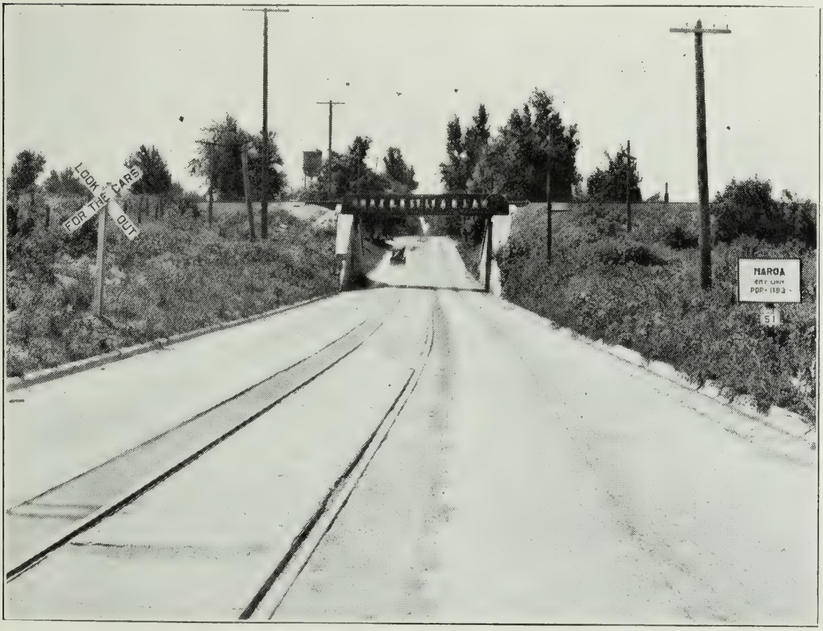

Figure 32.—The new subway under the Pennsylvania Railroad at Maroa.

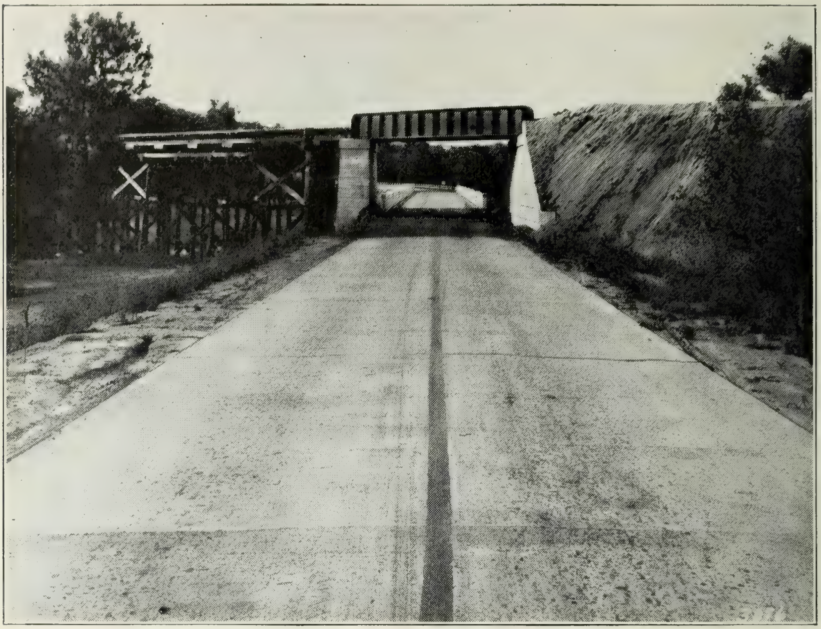

Figure 33.—Grade separation between Route 32 and the Vandalia Railroad and the bridge over the Little Okaw River near Lovington.

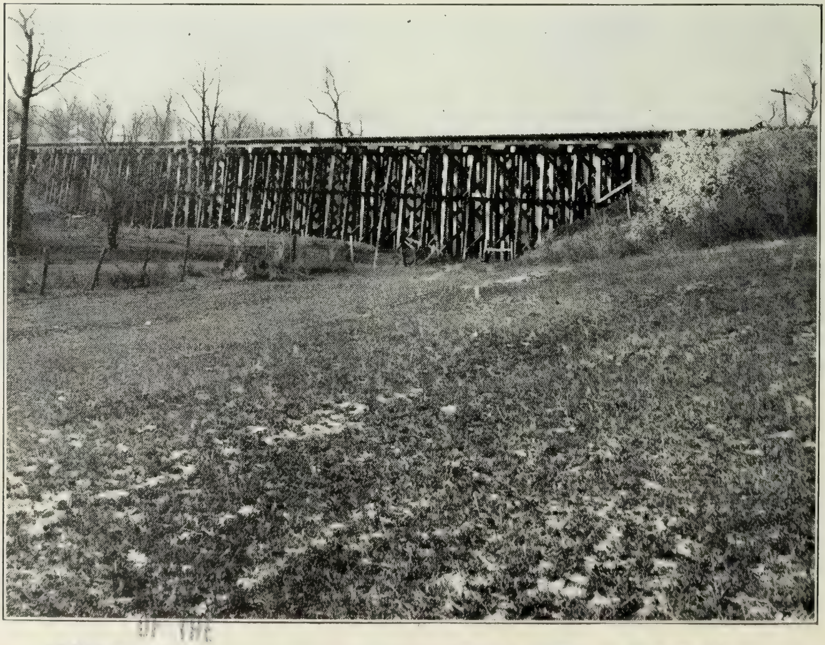

Figure 34.—Location of the improvements shown in Figure 33.

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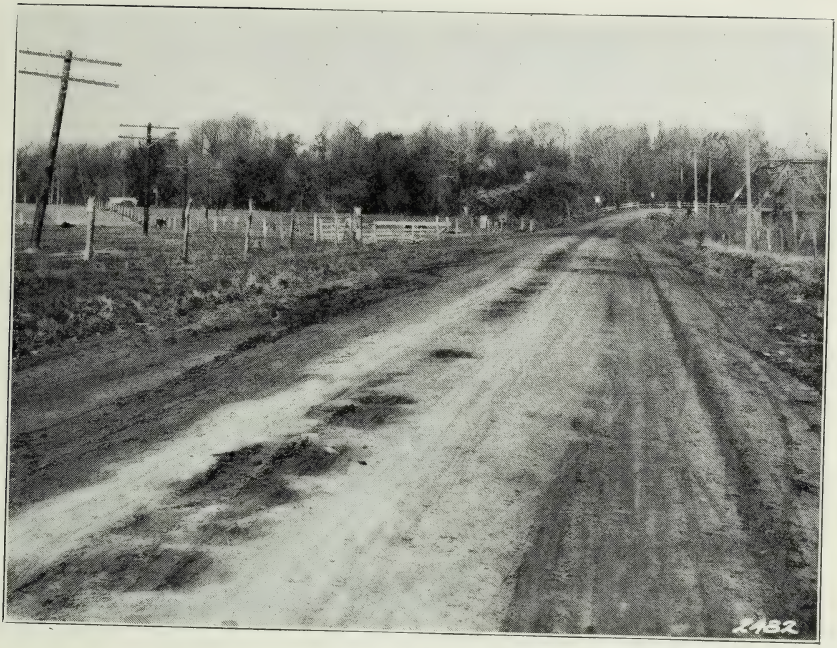

Figure 35.—Route 39 near Mahomet before construction.

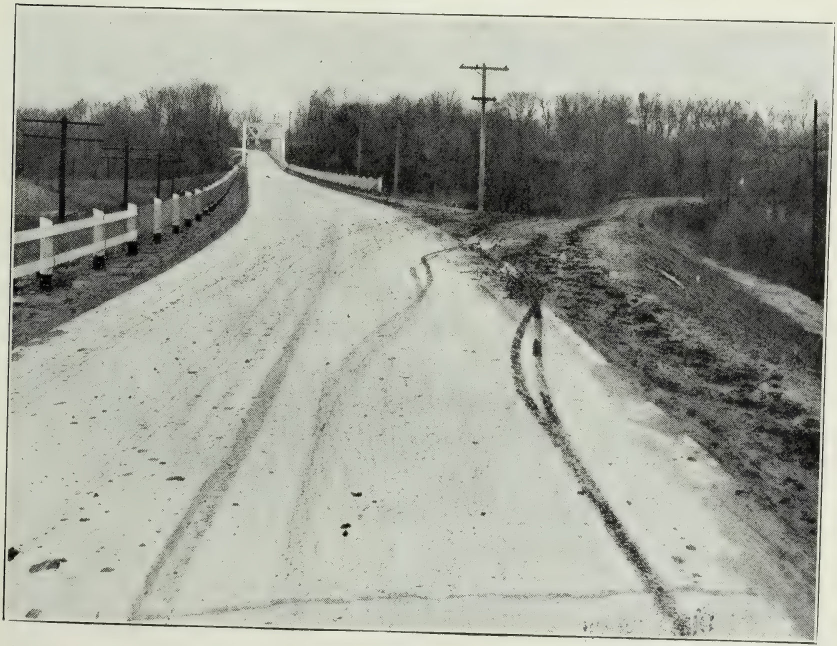

Figure 36.—Route 39 near Mahomet after construction, showing new alignment and the bridge over the Sangamon River.

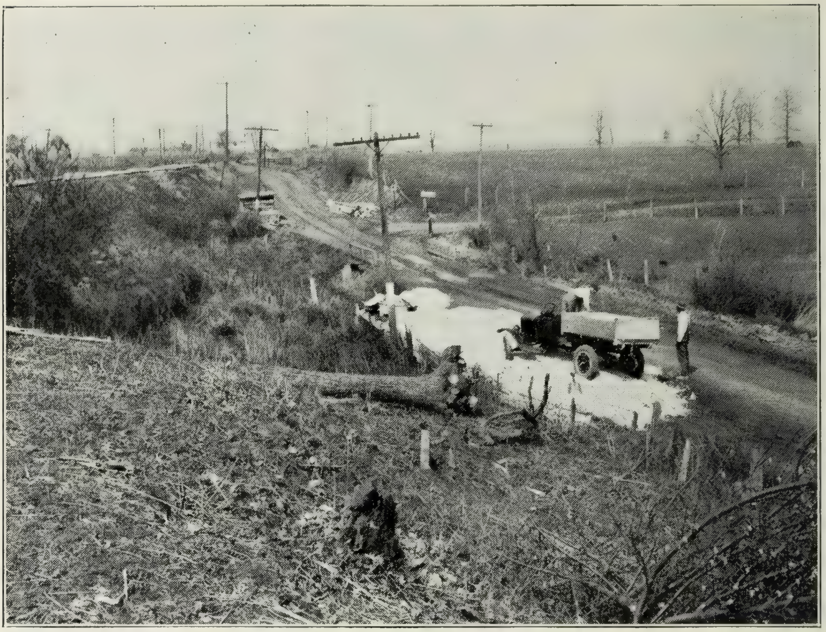

Figure 37.—A portion of Route 39 before construction.

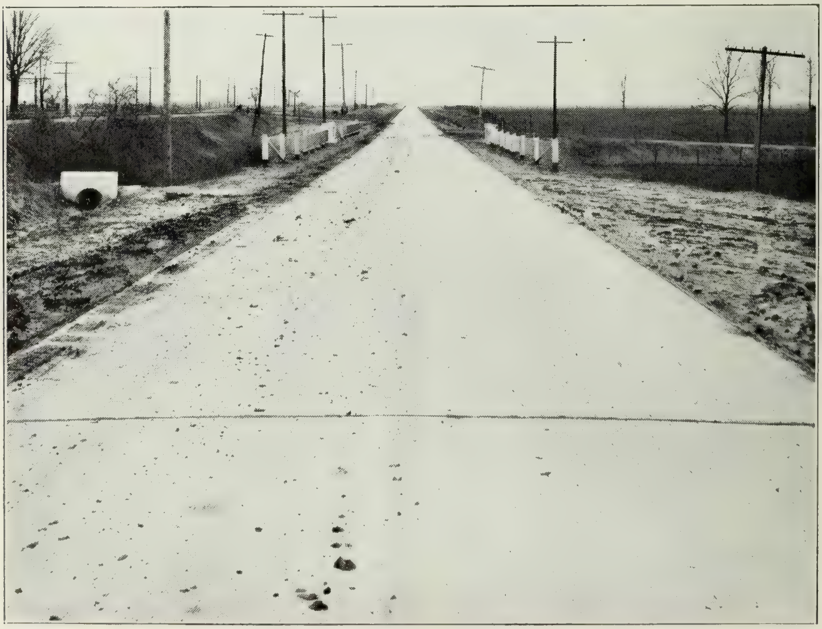

Figure 38.—The portion of Route 39 shown in Figure 37, after construction, showing improved alignment which eliminated a railroad grade crossing.

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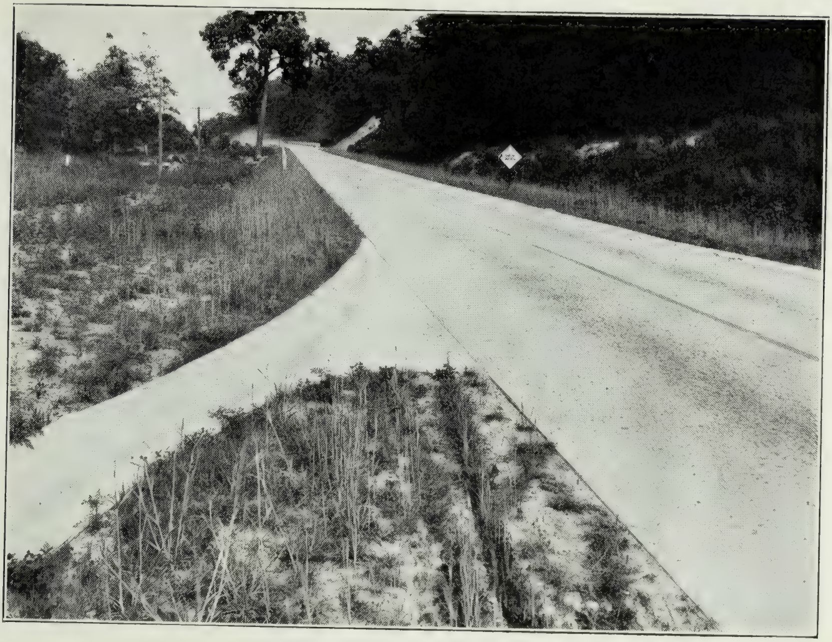

Figure 39.—An outlet for a lip curb section on Route 9.

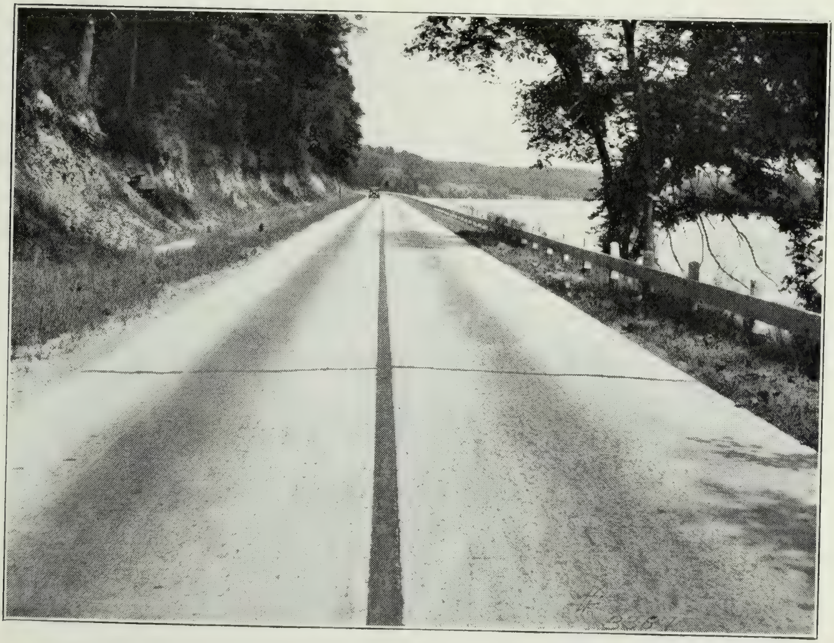

Figure 40.—Route 2 along the Rock River between Dixon and Rockford.

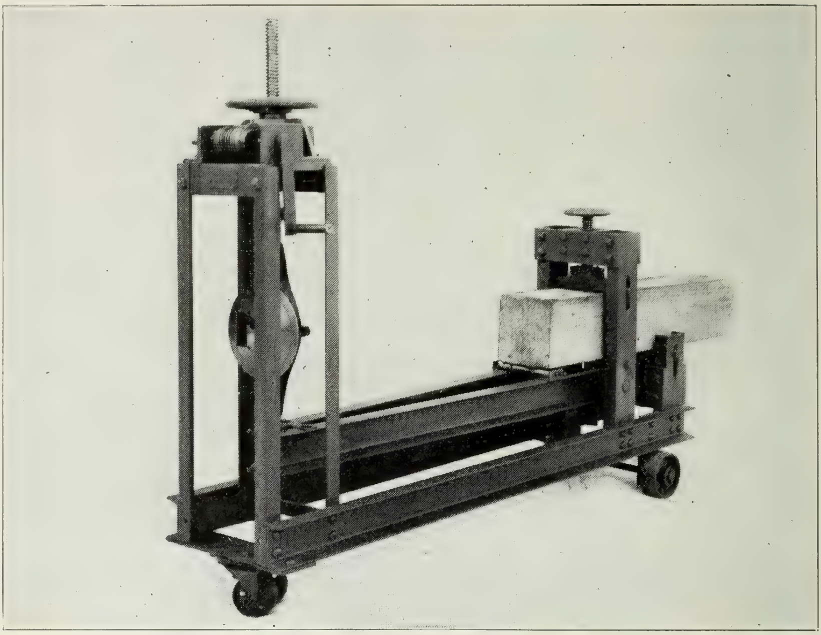

Figure 41.—Transverse testing machine designed and used by the Illinois Division of Highways.

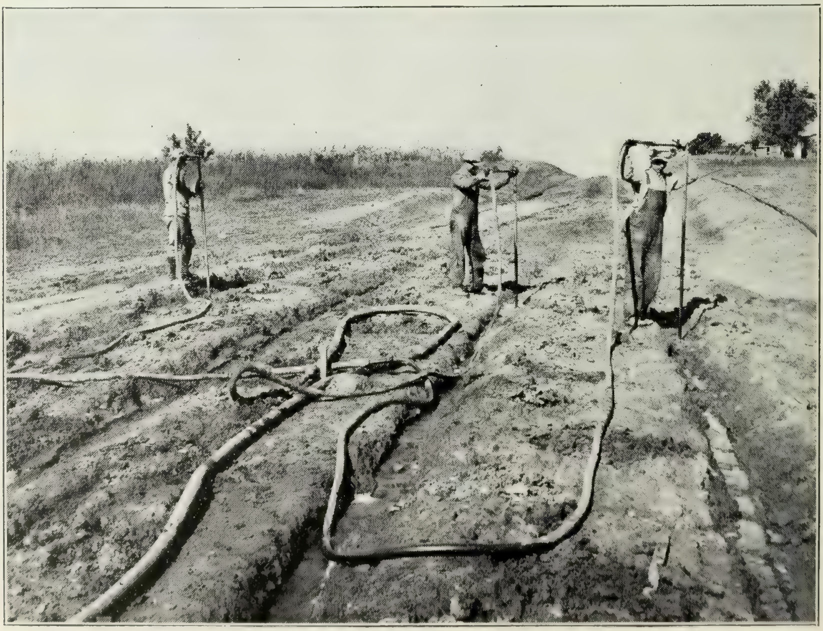

Figure 42.—Watersoaking an embankment on Route 24 east of Springfield.

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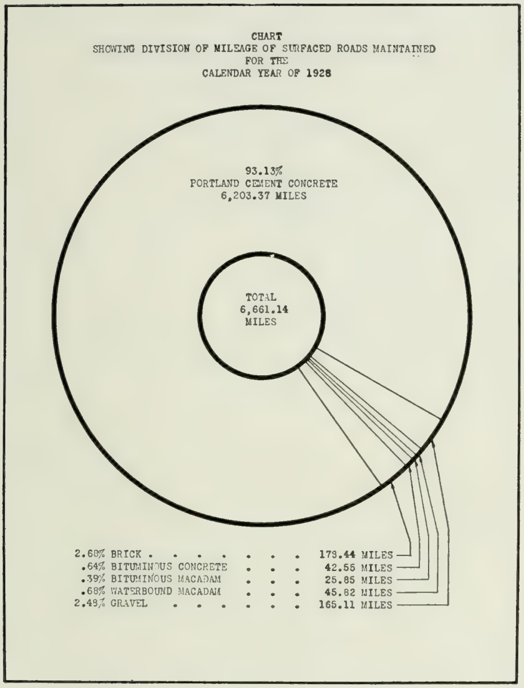


Figure 43.

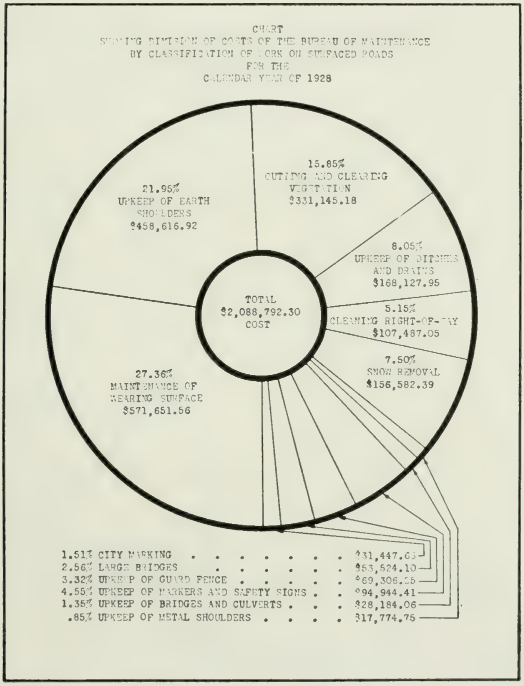
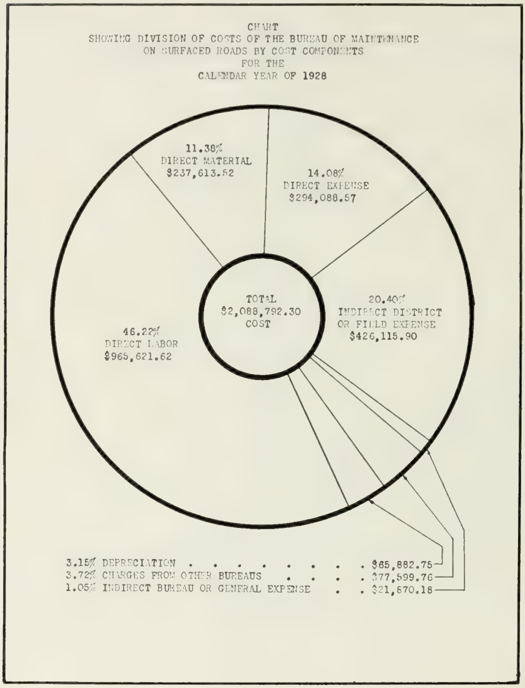


Figure 44.



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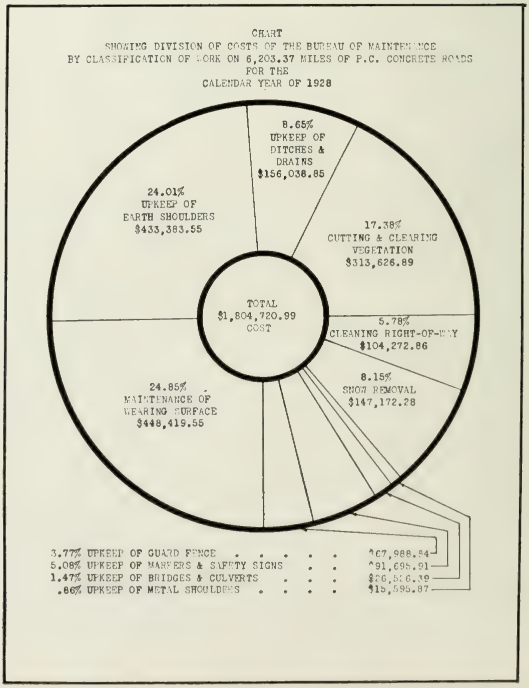

Figure 46.

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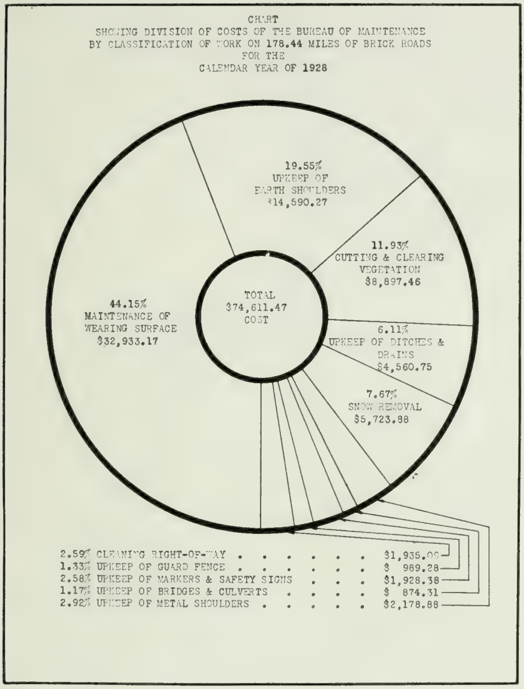

Figure 47.

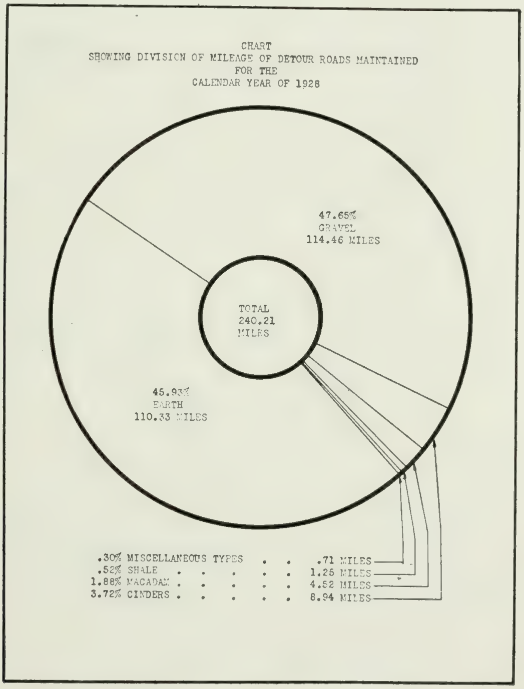

Figure 48.

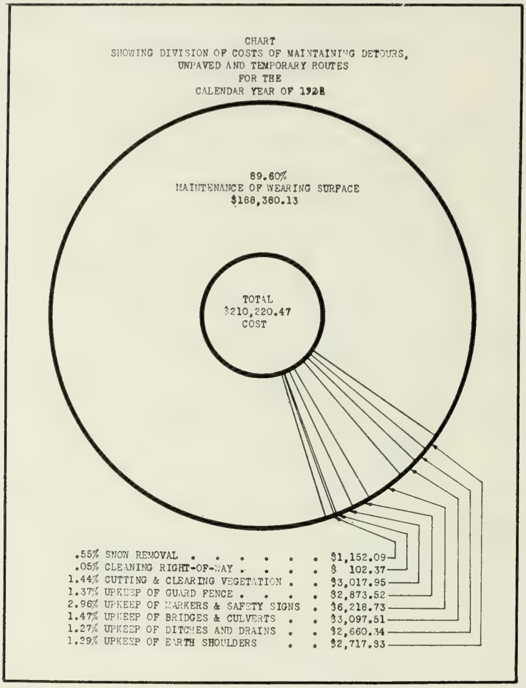

Figure 49.

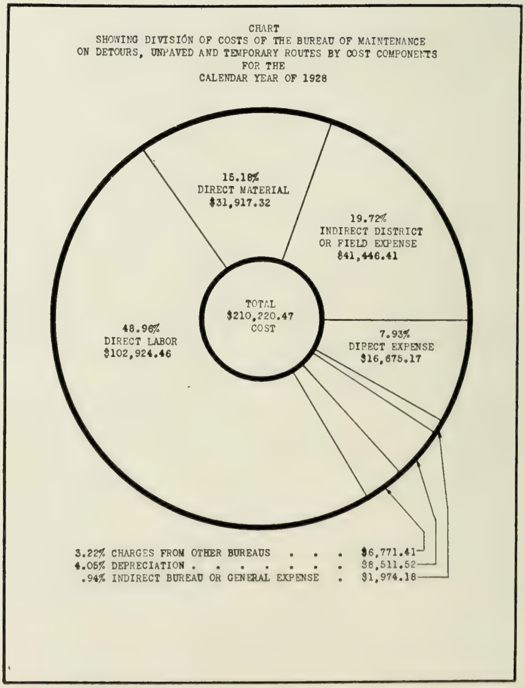

Figure 50.

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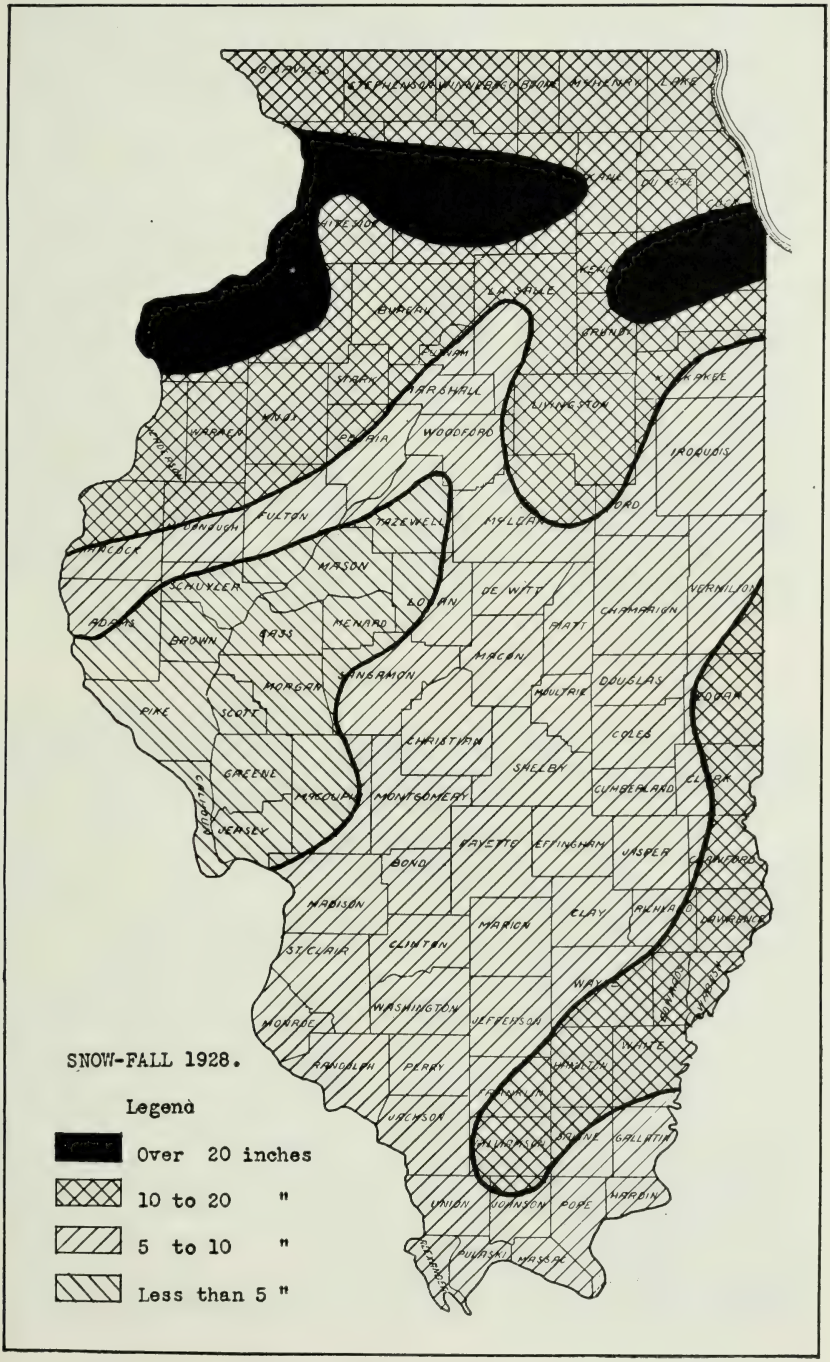
SNOW-FALL 1928.
Legend
Over 20 inches
10 to 20 "
5 to 10 "
Less than 5 "
JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
WHITESIDE
KANE
DU PAGE
COOK
KENDALL
LA SALLE
BUREAU
PUTNAM
GRUNDY
STARK
MARSHALL
KANKAKEE
LIVINGSTON
KNOX
WARREN
PEORIA
WOODFORD
HENDERSON
IROQUOIS
FORD
FULTON
MCDONOUGH
TAZEWELL
MCLEAN
HANCOCK
MASON
SCHUYLER
VERMILION
LOGAN
DE WITT
ADAMS
CHAMPAIGN
PIATT
BROWN
CASS
MENARD
MACON
SANGAMON
MORGAN
DOUGLAS
EDGAR
MOULTRIE
PIKE
SCOTT
COLES
CHRISTIAN
SHELBY
GREENE
CLARK
CUMBERLAND
CALHOUN
MACOUPIN
MONTGOMERY
JERSEY
FAYETTE
EFFINGHAM
JASPER
CRAWFORD
BOND
MADISON
CLAY
RICHLAND
LAWRENCE
MARION
CLINTON
ST CLAIR
WAYNE
EDWARDS
WABASH
WASHINGTON
JEFFERSON
MONROE
WHITE
HAMILTON
RANDOLPH
PERRY
FRANKLIN
JACKSON
WILLIAMSON
SALINE
GALLATIN
UNION
JOHNSON
POPE
HARDIN
ALEXANDER
PULASKI
MASSAC

Figure 51.

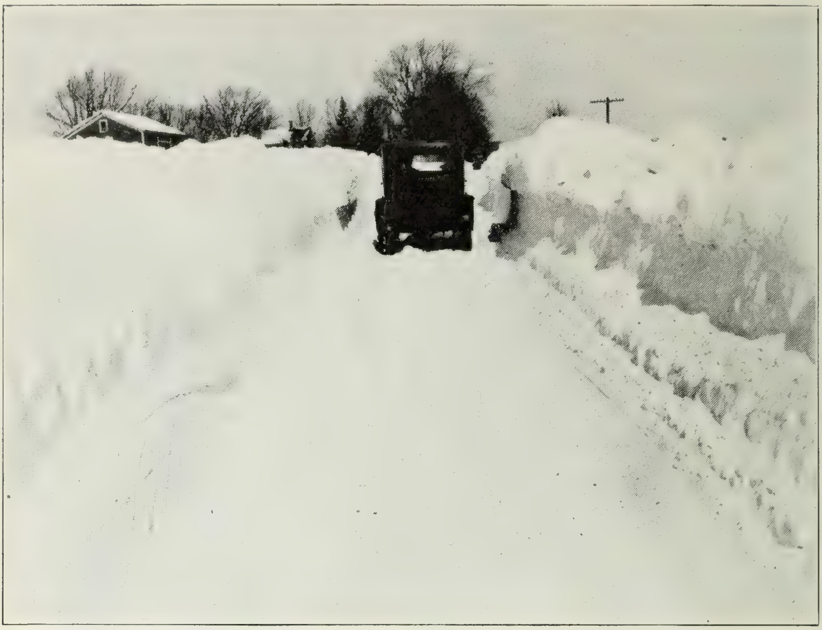

Figure 52.—Snow drift on Route 78, one mile south of Warren, JoDaviess County, December, 1928.

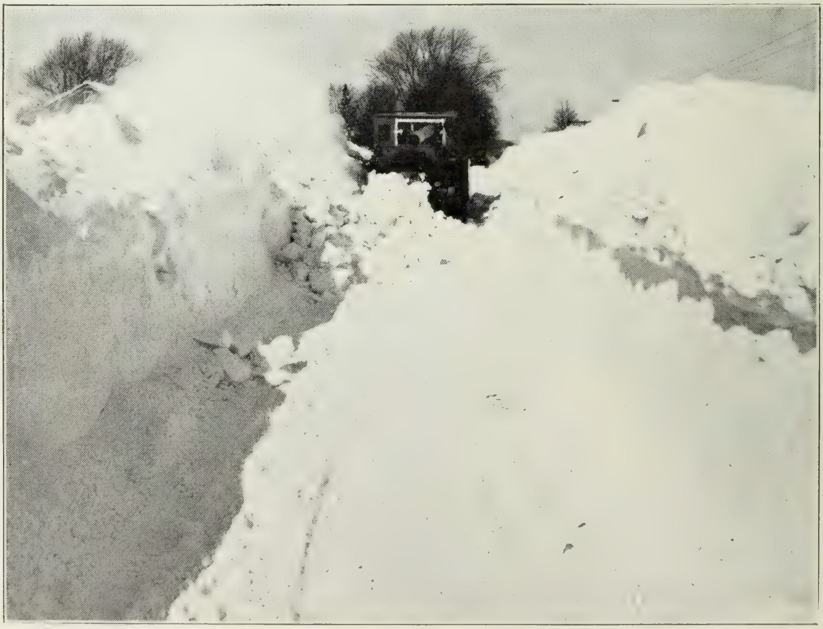

Figure 53.—Rotary snow plow working in the snow drift shown in Figure 52.

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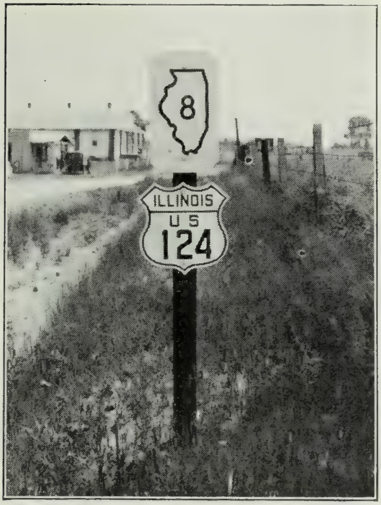

Figure 54.

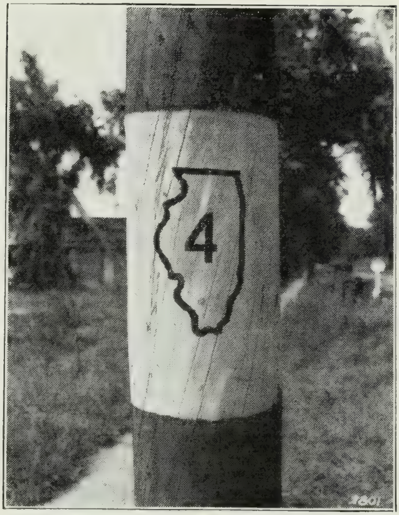

Figure 55.

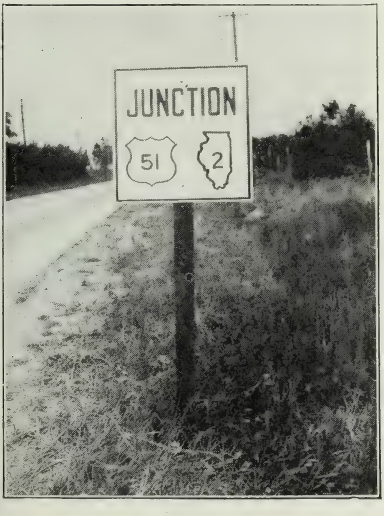

Figure 56.

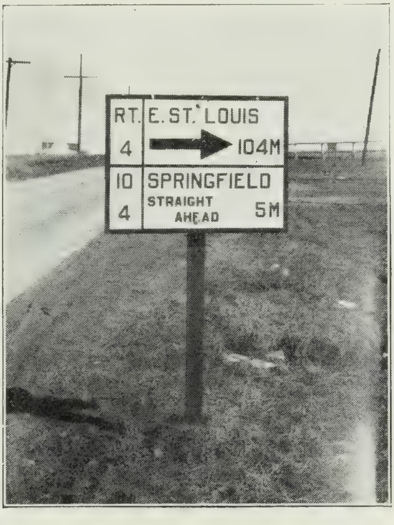

Figure 57.

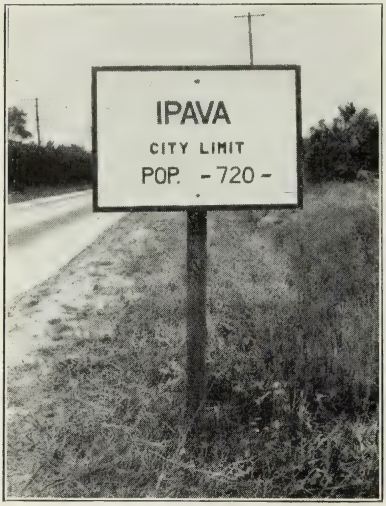

Figure 58.

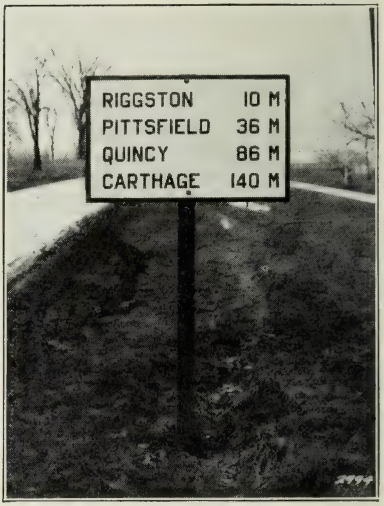

Figure 59.

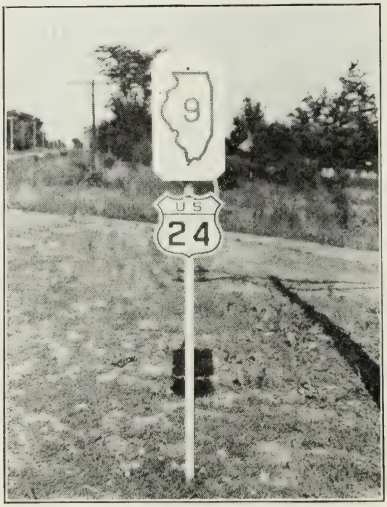

Figure 60.

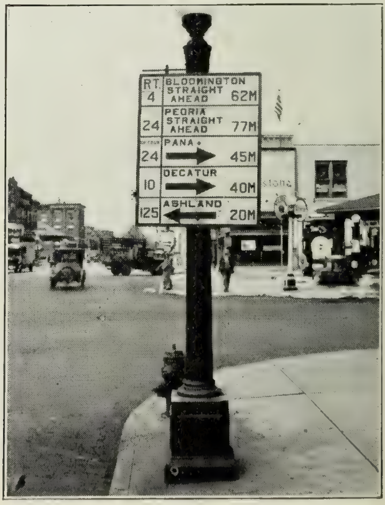

Figure 61.

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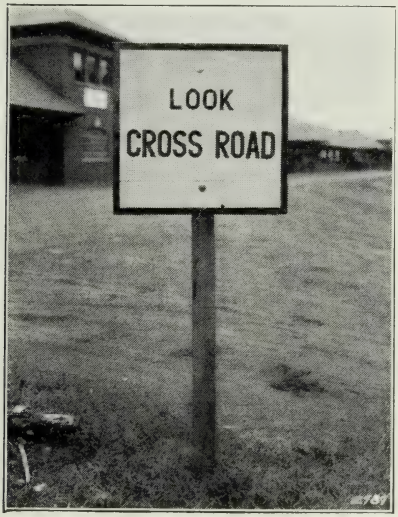
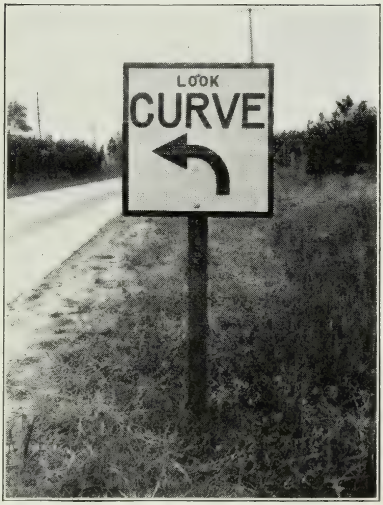


Figure 62.



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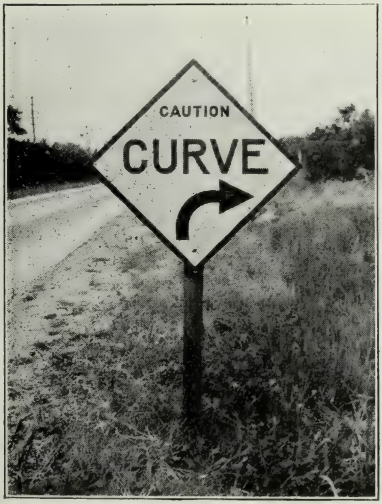
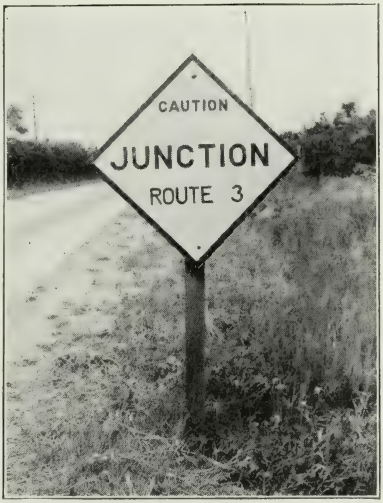


Figure 64.



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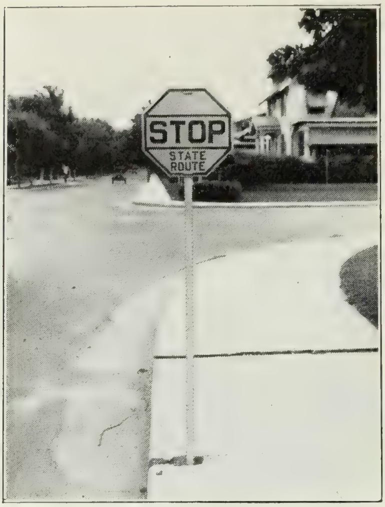

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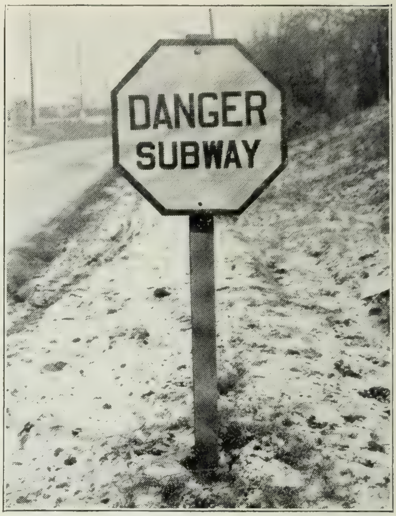

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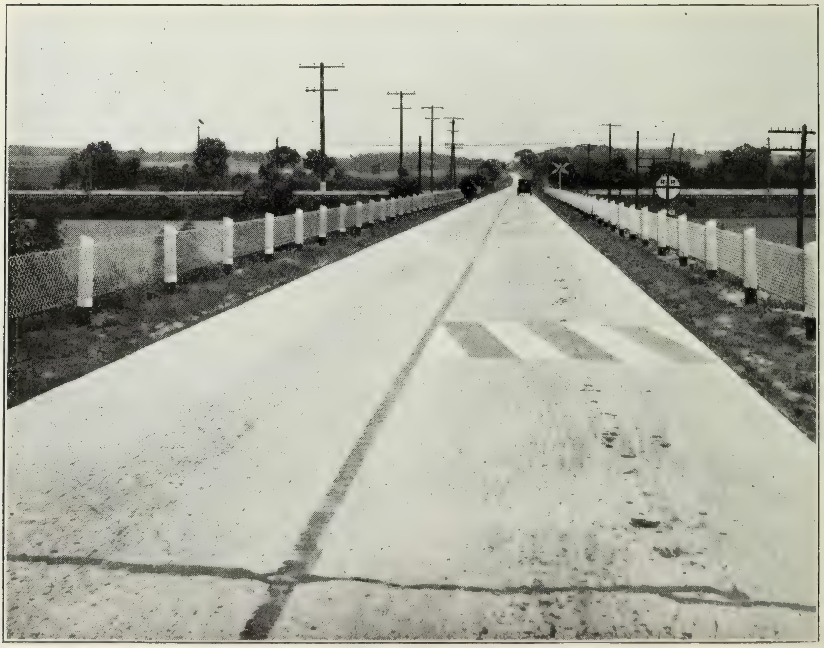

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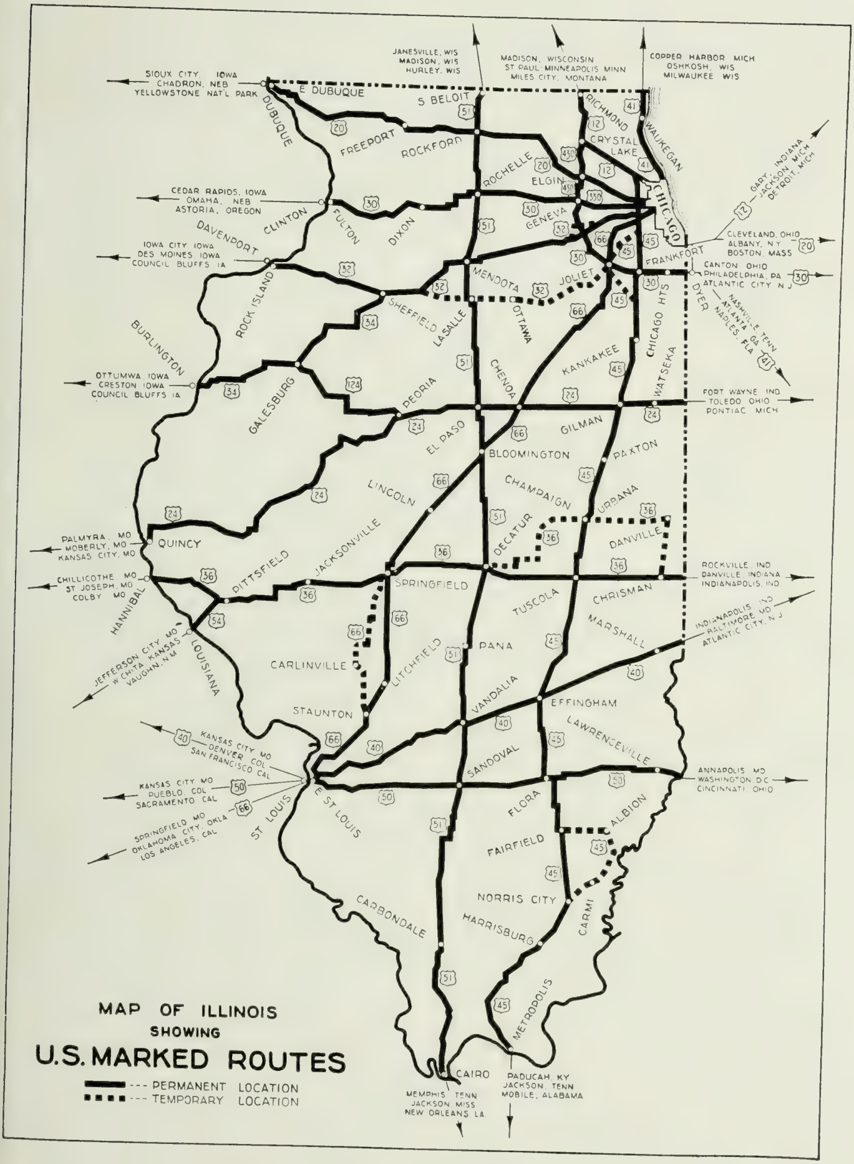
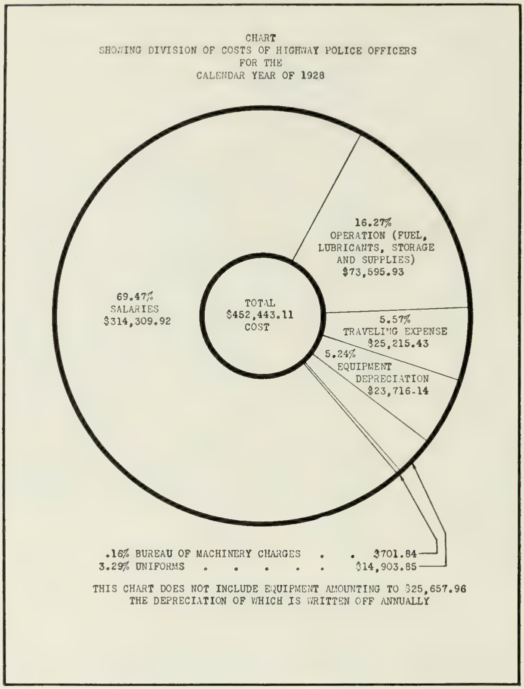

MAP OF ILLINOIS
SHOWING
U.S. MARKED ROUTES
--- PERMANENT LOCATION
--- TEMPORARY LOCATION
SIOUX CITY, IOWA
CHADRON, NEB
YELLOWSTONE NAT'L PARK
JANESVILLE, WIS
MADISON, WIS
HURLEY, WIS
MADISON, WISCONSIN
ST PAUL-MINNEAPOLIS MINN
MILES CITY, MONTANA
COPPER HARBOR MICH
OSHKOSH, WIS
MILWAUKEE WIS
E DUBUQUE
DUBUQUE
S BELOIT
FREEPORT
ROCKFORD
RICHMOND
CRYSTAL LAKE
WAUKEGAN
ROCHELLE
ELGIN
GENEVA
CHICAGO
CEDAR RAPIDS, IOWA
OMAHA, NEB
ASTORIA, OREGON
CLINTON
FULTON
DIXON
DAVENPORT
IOWA CITY IOWA
DES MOINES IOWA
COUNCIL BLUFFS IA
ROCK ISLAND
MENDOTA
JOLIET
FRANKFORT
GARY, INDIANA
JACKSON, MICH
DETROIT, MICH
CLEVELAND, OHIO
ALBANY, N Y
BOSTON, MASS
CANTON OHIO
PHILADELPHIA, PA
ATLANTIC CITY N J
NASHVILLE TENN
ATLANTA GA
NAPLES, FLA
DYER
SHEFFIELD
LASALLE
OTTAWA
CHICAGO HTS
BURLINGTON
OTTUMWA, IOWA
CRESTON IOWA
COUNCIL BLUFFS IA
GALESBURG
CHENOA
KANKAKEE
WATSEKA
PEORIA
FORT WAYNE IND
TOLEDO OHIO
PONTIAC MICH
EL PASO
GILMAN
BLOOMINGTON
PAXTON
LINCOLN
CHAMPAIGN
URBANA
DANVILLE
QUINCY
PALMYRA, MO
MOBERLY, MO
KANSAS CITY, MO
CHILLICOTHE MO
ST JOSEPH, MO
COLBY MO
HANNIBAL
PITTSFIELD
JACKSONVILLE
DECATUR
SPRINGFIELD
ROCKVILLE IND
DANVILLE, INDIANA
INDIANAPOLIS, IND
TUSCOLA
CHRISMAN
JEFFERSON CITY MO
KANSAS
WICHITA KANSAS
VAUGHN, N.M
LOUISIANA
CARLINVILLE
PANA
MARSHALL
INDIANAPOLIS IND
BALTIMORE MD
ATLANTIC CITY, N J
LITCHFIELD
VANDALIA
EFFINGHAM
STAUNTON
LAWRENCEVILLE
KANSAS CITY MO
DENVER COL
SAN FRANCISCO CAL
KANSAS CITY MO
PUEBLO, COL
SACRAMENTO CAL
SPRINGFIELD MO
OKLAHOMA CITY, OKLA
LOS ANGELES, CAL
ST LOUIS
E ST LOUIS
SANDOVAL
ANNAPOLIS MD
WASHINGTON D.C
CINCINNATI, OHIO
FLORA
ALBION
FAIRFIELD
NORRIS CITY
CARMI
CARBONDALE
HARRISBURG
METROPOLIS
CAIRO
MEMPHIS TENN
JACKSON MISS
NEW ORLEANS LA
PADUCAH, KY
JACKSON, TENN
MOBILE, ALABAMA
20
51
41
12
430
330
30
32
66
45
34
124
24
36
54
50
40
...

Figure 69.



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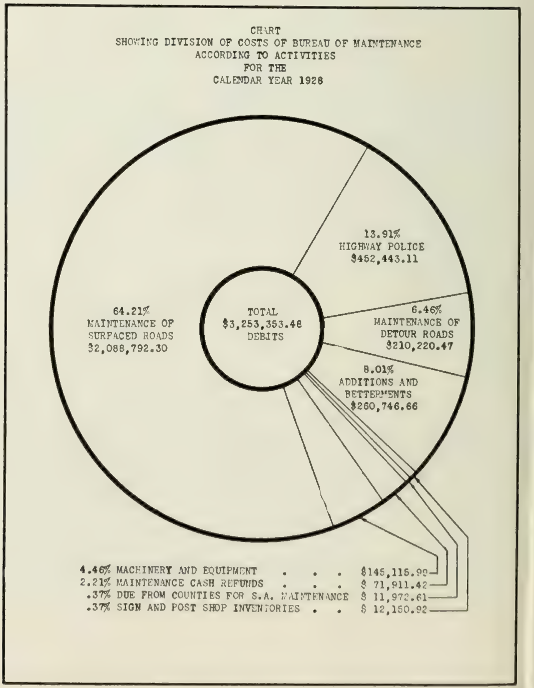

Figure 71.

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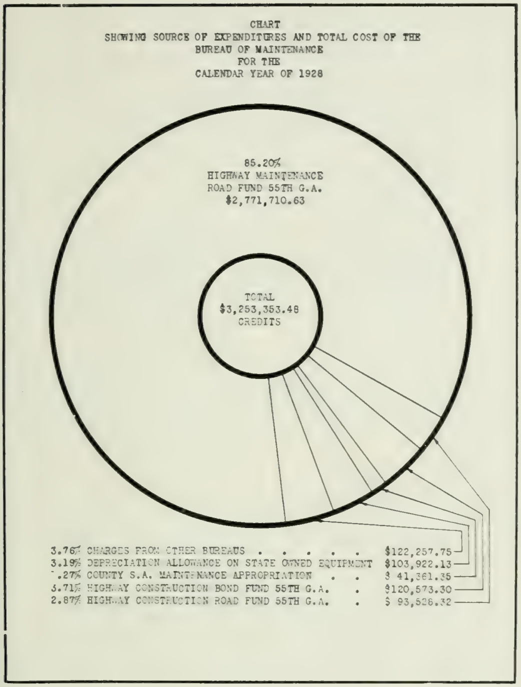

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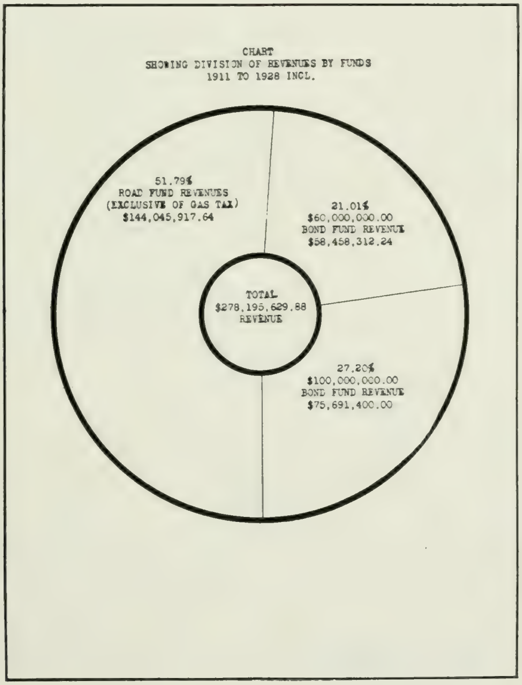

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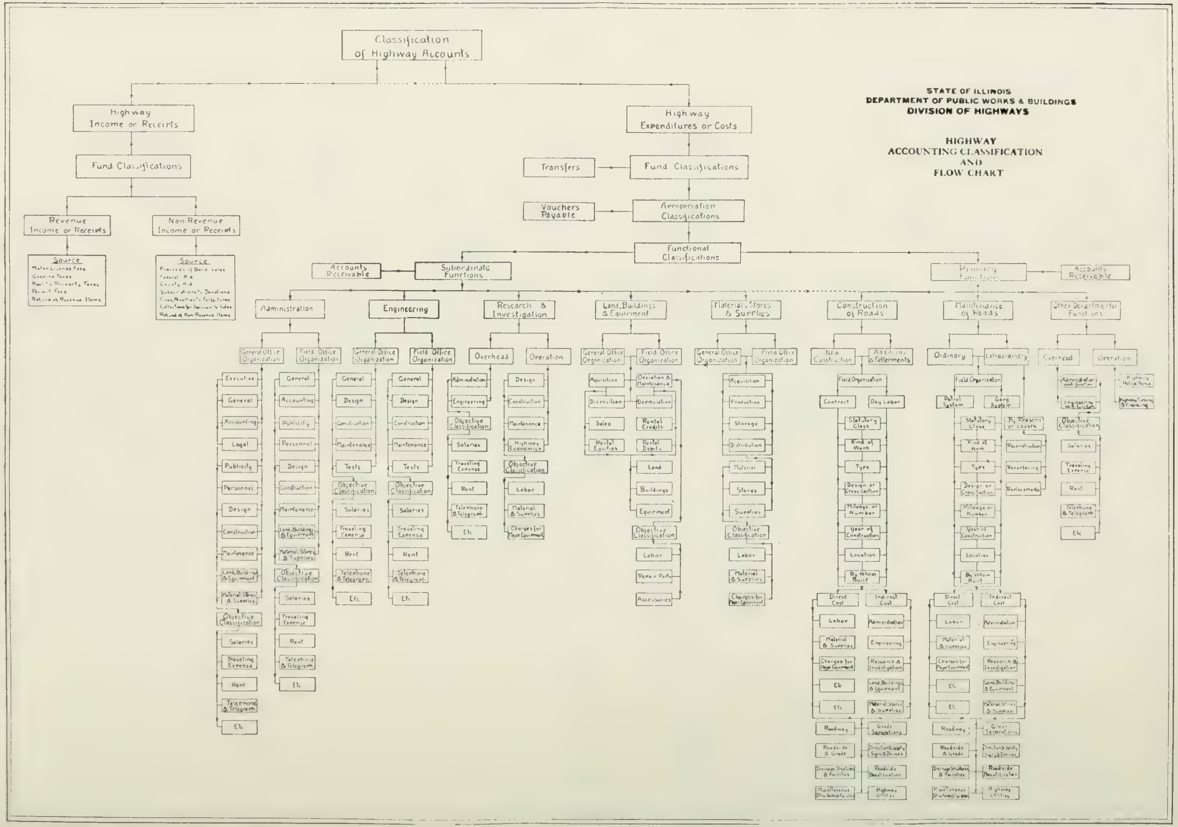

Figure 74.

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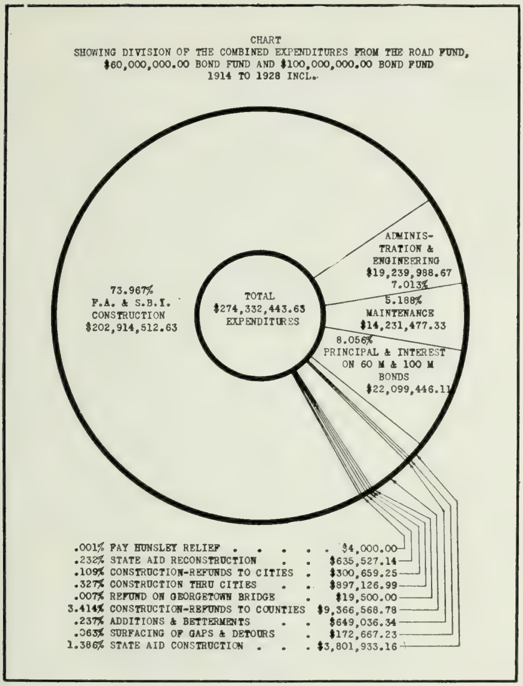

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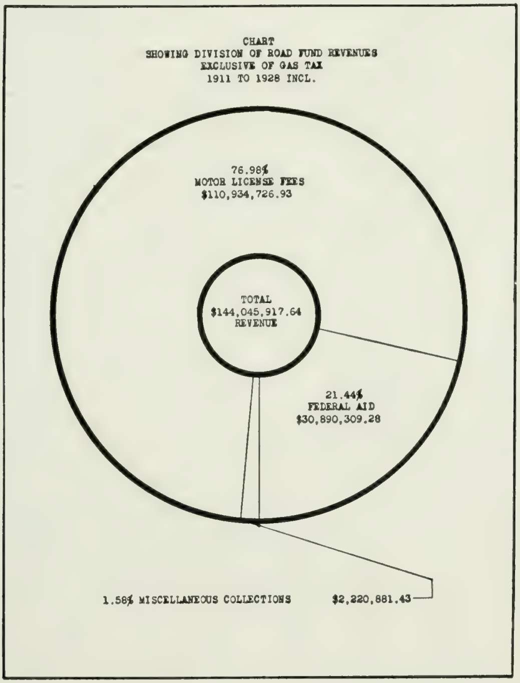

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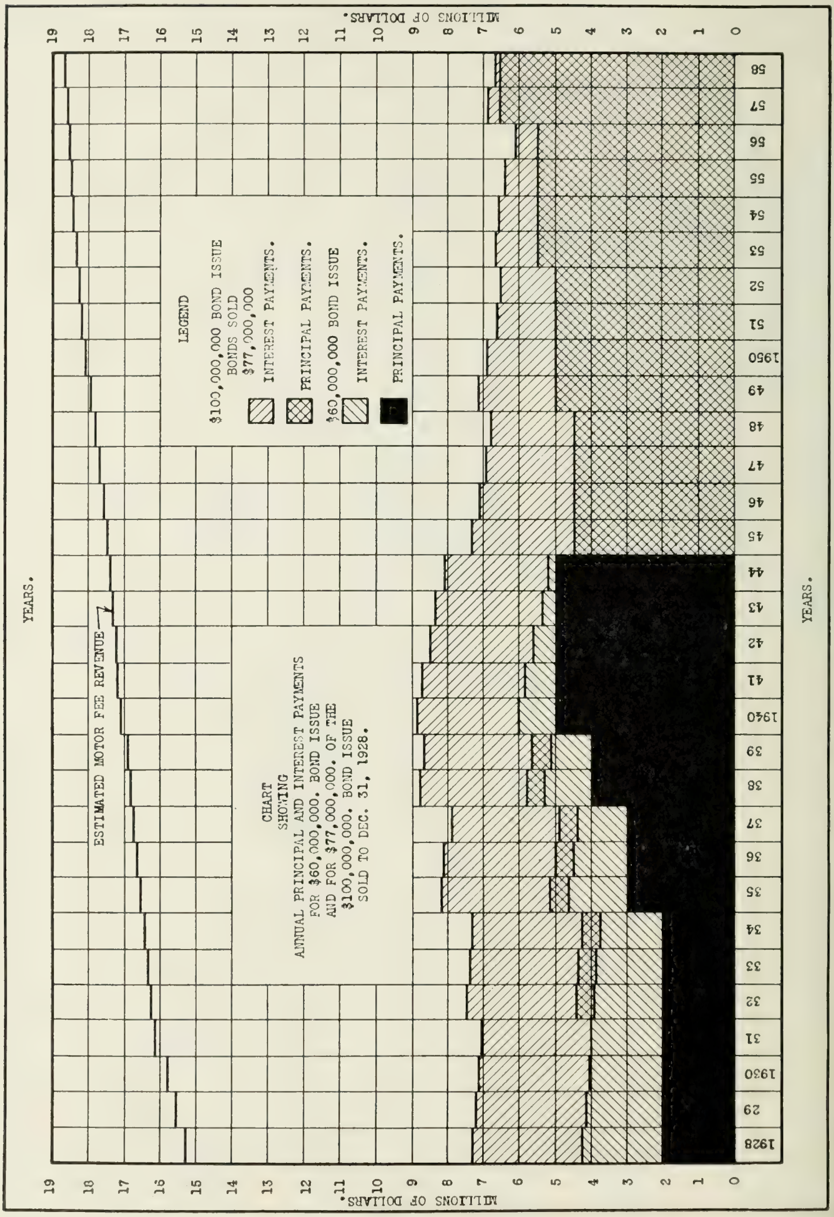

Figure 77.

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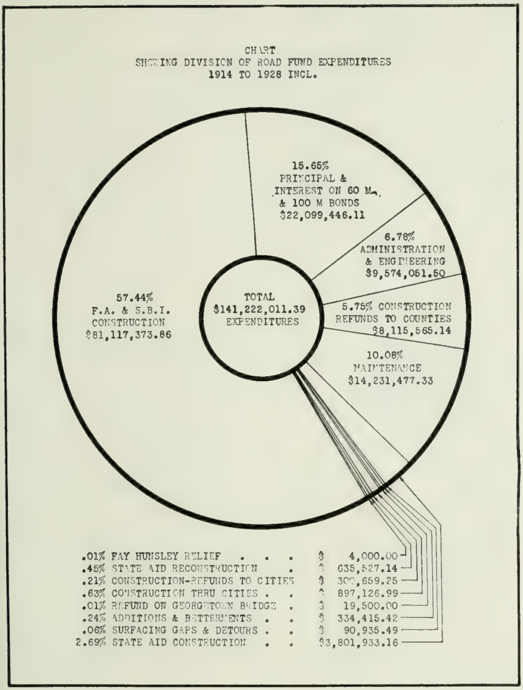

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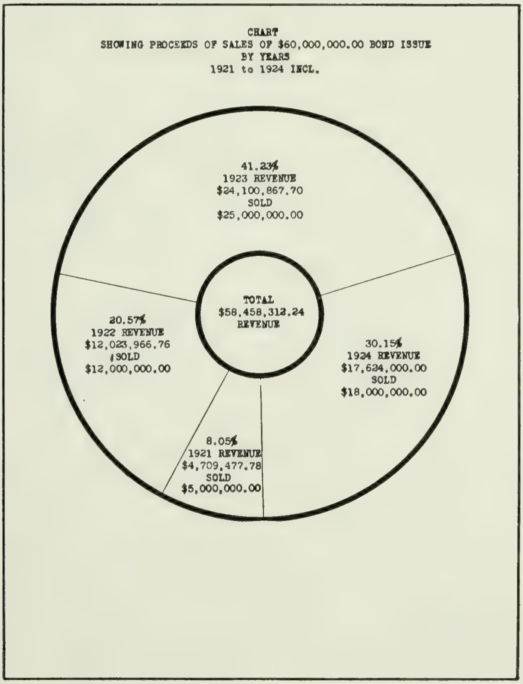

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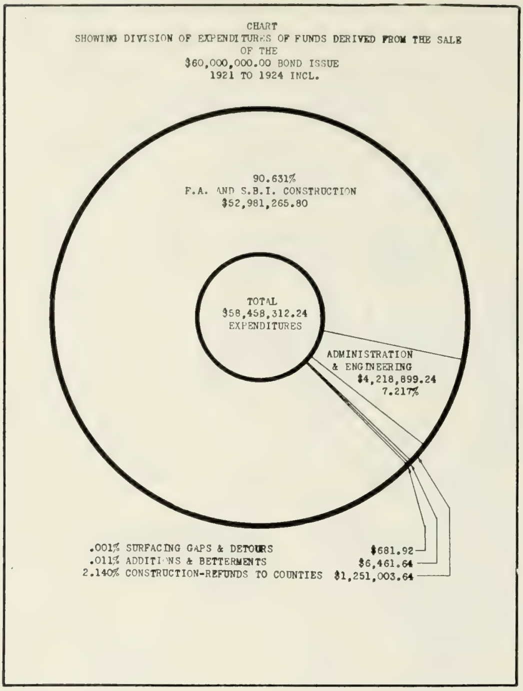

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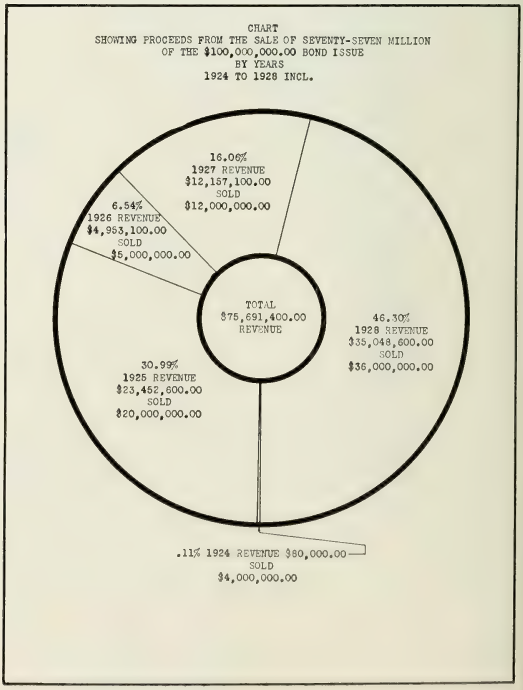

Figure 81.

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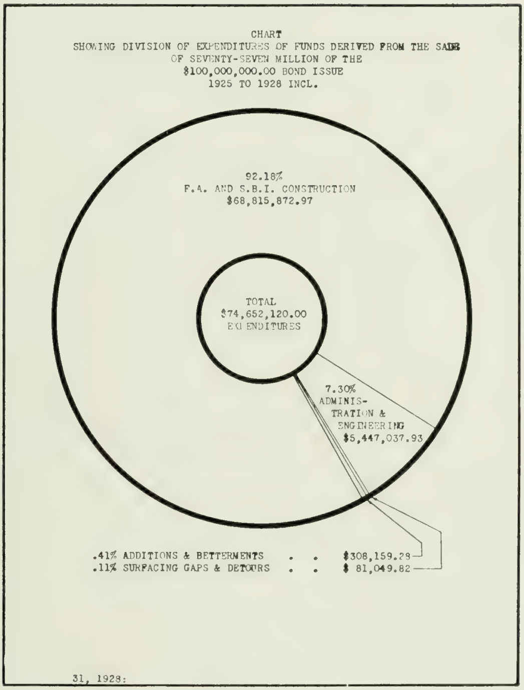

CHART
SHOWING DIVISION OF EXPENDITURES OF FUNDS DERIVED FROM THE SALE
OF SEVENTY-SEVEN MILLION OF THE
$100,000,000.00 BOND ISSUE
1925 TO 1928 INCL.

Figure 82.

THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

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AND BUILDINGS

LOUIS L. EMMERSON, *Governor*
HARRY H. CLEAVELAND, *Director*
FRANK T. SHEETS, *Chief Highway Engineer*

TWELFTH ANNUAL REPORT
--of--
DIVISION OF HIGHWAYS

January 1, 1929
--to--
December 31, 1929

AUG. 26TH 1818

[Reprinted from the Twelfth Administrative Report. Printed by authority of the State of Illinois.]

TWELFTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

DIVISION OF HIGHWAYS

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OCT 9 1930
UNIVERSITY OF ILLINOIS.

Intersection of Routes 7 and 29 near DePue, Bureau County.

TWELFTH ANNUAL REPORT

OF

THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS

Division of Highways

January 1, 1929

TO

December 31, 1929

AUG. 26TH 1818

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HARRY H. CLEAVELAND, Director
FRANK T. SHEETS, Chief Highway Engineer

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THE DEPARTMENT OF PUBLIC WORKS AND BUILDINGS.

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Harry H. Cleaveland, *Director.*
Don Garrison, *Assistant Director.*

Highway Advisory Board.

Richard R. Meents, *Chairman.*
Reed F. Cutler, E. E. Crabtree, James P. Wilson, Frank H. Harrison, H. M. Dunlap, Henry C. Allen,
J. M. Page, Will J. Bell.

Division of Highways.

Frank T. Sheets, *Chief Highway Engineer.*
Ralph R. Benedict, *Assistant Chief Highway Engineer.*

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H. E. Surman, *Engineer of Design.*
E. D. Dryfoose, *Engineer of Roads.*
G. F. Burch, *Engineer of Bridges.*
C. M. Hathaway, *Engineer of Construction.*
Fred Tarrant, *Engineer of Maintenance.*
V. L. Glover, *Engineer of Materials.*
J. M. McCoy, *Chief Clerk.*
Geo. H. Baker, *Superintendent of Day Labor Construction.*
Walter Moody, *Superintendent of Police.*

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District No. 2—O. F. Goeke, Dixon, Ill.
District No. 3—M. J. Fleming, Ottawa, Ill.
District No. 4—Theo. Plack, Peoria, Ill.
District No. 5—Chas. H. Apple, Paris, Ill.
District No. 6—K. N. Evans, Springfield, Ill.
District No. 7—P. F. Jervis, Effingham, Ill.
District No. 8—C. M. Slaymaker, E. St. Louis, Ill.
District No. 9—L. Schwartz, Carbondale, Ill.

CONTENTS.

PAGE.

I. INTRODUCTION 1

II. BUREAU OF DESIGN 8
  A. ROAD SECTION 8
    1. Duties 8
    2. Surveys and Plans 8
    3. Contracts Awarded 9
    4. Design Policies 14
    5. Pavement Cross Sections 17
    6. Grade Separations 17
    7. Federal Aid 20
    8. Refunds to Counties and Municipalities 22
    9. State Aid System 26
    10. Traffic Maps 28
  B. BRIDGE SECTION 29
    1. Duties 29
    2. Work Accomplished in 1929 29
    3. Overhead Grade Separations 30
    4. Record of Bridge Work, 1906 to 1929 30
    5. Description of Photographs 32

III. BUREAU OF CONSTRUCTION 39
    1. Duties 39
    2. Work Accomplished During 1929 39
    3. Improved Roads 41
    4. Grading 46
    5. Bridges 48
    6. Grade Separations 51
    7. Day Labor Construction 52
    8. Cement 53
    9. Crushed Stone 54
    10. Core Drill Outfits 55
    11. Freight Rate Division 56
    12. Construction Policies 56

IV. BUREAU OF MATERIALS 61
    1. Duties 61
    2. Laboratory Inspection of Materials 61
    3. Plant Inspection of Materials 64
    4. Research and Investigations 70
    5. Preparation of Reports and Bulletins 73
    6. Specifications 73
    7. Departmental Service 73

V. BUREAU OF MAINTENANCE 76
    1. Duties 76
    2. Maintenance of Surfaced Roads 76
    3. Maintenance of Detours, Unpaved and Temporary Routes 82
    4. Maintenance of Large Bridges 90
    5. Construction of Additions and Betterments 90
    6. Snow Removal 93
    7. Route Markers and Signs 95
    8. Right of Way Posts 99
    9. Equipment 105
    10. Permits and Franchises 105
    11. Route Bulletins 105
    12. Cost Accounting 106
    13. Accident Reports 108
    14. Bureau of Police 110

VI. BUREAU OF AUDITS 112
    1. Duties 112
    2. Administrative Section 112
    3. Accounting Section 113
    4. Blueprinting and Supply Section 116
    5. Central and Storage Files Section 117
    6. Statements, Charts and Statistics 118

TABLES.

BUREAU OF DESIGN.

ROAD SECTION.

No.		Text on Page.	Table on Page.
1.	Federal Aid and State Bond Issue Contracts Awarded	9	9
2.	15d Contracts Awarded	10	10
3.	Contracts Awarded for County 15d Work	10	10
4.	Construction Through Cities, Built from Special Appropriations by the Legislature	11	11
5.	Grade Separations Completed, 1929	17	17
6.	Grade Separations Under Contract but not Completed During 1929	17	20
7.	Grade Separation Cases Settled, 1929	20	21
8.	Federal Aid Allotments	20	22
9.	Status of Federal Aid, December 31, 1929	20	23, 24
10.	Refund to Counties	22	25
11.	Refund to Municipalities	26	26
12.	Status of State Aid Mileage	27	27, 28

BRIDGE SECTION.

No.		Text on Page.	Table on Page.
13.	Preliminary Grade Separation Plans Prepared	30	31
14.	Complete Grade Separation Plans Prepared	30	31
15.	Grade Separation Contracts Awarded	30	31
16.	Bridge Plans Prepared and Contracts Awarded From 1906 to 1929	30	32

BUREAU OF CONSTRUCTION.

No.		Text on Page.	Table on Page.
17.	Summary of 1929 Construction	40	40
18.	Summary of Different Types of Improved Roads Constructed in 1929	41	42
19.	State Bond Issue Construction in the Chicago Metropolitan Area	41	42
20.	Total Net Mileage Available to Traffic in Each County, as of January 1, 1930	45	45, 46
21.	Sections Completed by State Day Labor Outfits	52	52
22.	Table Showing Cubic Yards of Crushed Stone Requisitioned and Shipped from the Joliet and Menard Penitentiaries	55	55

BUREAU OF MATERIALS.

No.		Text on Page.	Table on Page.
23.	Preliminary Samples Tested in the Springfield Laboratories During the Calendar Year 1929	62	62
24.	Acceptance Samples Tested in Springfield Laboratories During Calendar Year 1929	62	63
25.	Check Samples Tested in Springfield Laboratories During Calendar Year 1929	63	63
26.	Quality Samples Tested in Springfield Laboratories During Calendar Year 1929	64	64
27.	Quantities Represented by Acceptance Samples Tested in Springfield Laboratories During Calendar Year 1929	64	65
28.	Quantity of Materials Accepted for Illinois Highway Work by Plant Inspection and Unit Cost of Inspection for the Calendar Year 1929	65	65
29.	Quantities of Materials Inspected for Other Departments of the State of Illinois and for Other States During the Calendar Year 1929	66	66
30.	Quantities of Aggregates Accepted	66	66
31.	Quantities of Lumber, Piling and Posts Accepted	68	68
32.	Number of Concrete Cylinders Received for Tests	71	71
33.	Number and Kind of Concrete Road Cores Tested During 1929	71	72
34.	Number of Films and Prints Prepared for the Various Bureaus During 1929	74	74
35.	Paint Handled by Bureau of Materials During the Calendar Year 1929	74	75

BUREAU OF MAINTENANCE.

No.		Text on Page.	Table on Page.
36.	Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Surfaced Roads Maintained on a Calendar Year Basis for 1929 in All Districts	77	78
37.	Statement Showing Comparison of Miles and Cost of Various Types Maintained During the Calendar Year 1929	78	79
38.	Statement Showing Comparison of Mileages and Cost on Per Mile Basis by Types and Units for the Calendar Year 1929	78	80
39.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 7,284.89 Miles of Concrete Roads in All Districts for the Calendar Year 1929	82	84
40.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 203.38 Miles of Brick Roads in All Districts for the Calendar Year 1929	82	85
41.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 40.66 Miles of Bituminous Concrete Roads in All Districts for the Calendar Year 1929	82	86
42.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 25.68 Miles of Bituminous Macadam Roads in All Districts for the Calendar Year 1929	82	87
43.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 46.71 Miles of W. B. Macadam Roads in All Districts for the Calendar Year 1929	82	88
44.	Consolidated Statement Showing Cost of Maintenance and Upkeep of 171.48 Miles of Gravel Roads in All Districts for the Calendar Year 1929	82	89
45.	Consolidated Statement Showing the Number of Patrols and Miles of Various Types of Detour Roads Maintained on a Calendar Year Basis for 1929 in All Districts	82	90
46.	Consolidated Statement Showing Cost of Maintenance and Upkeep on All Types of 1,118.30 Miles of Detours, Unpaved and Temporary Routes for the Calendar Year 1929	90	92
47.	Statement Showing Cost of Maintenance and Upkeep of Bridges Over 100 Foot Span (Located in the Various Districts) for the Calendar Year 1929	90	93
48.	Statement Showing Cost of Additions and Betterments in All Districts for the Calendar Year 1929	93	94
49.	Statement Showing Cost of Removing Snow on Surfaced Roads for the Northern, Central and Southern Zones for the Calendar Year 1929	93	97
50.	Statement Showing Cost of Marking Routes Through Cities in All Districts for the Calendar Year 1929	99	105
51.	Trial Balance Covering Transactions of the Bureau of Maintenance for the Calendar Year 1929	106	106, 107
52.	Tabulation Showing Activities of State Highway Police Force for the Calendar Year 1929	110	110

BUREAU OF AUDITS.

No.		Text on Page.	Table on Page.
53.	Summary of Yearly Expenditures, 1913 to 1929, Inclusive; Road Fund, $60,000,000 and $100,000,000 Bond Funds, General Revenue Fund and Motor Fuel Tax Fund Appropriations	118	127, 129
54.	Statement Showing Balances, Receipts and Expenditures for All Funds Combined for the Calendar Year 1929	118	130
55.	Revenue and Expenditure Statement for All Funds During the Calendar Year 1929	118	131, 132
56.	Highway Bond Retirement and Interest Calculations on All Series of the $60,000,000 and on $98,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1929	118	133
57.	Highway Bond Retirement and Interest Calculations Showing the Amount of Principal Due at Each Retirement Period on the Entire $60,000,000 Bond Issue Plus $98,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1929	118	134
58.	Highway Road Retirement and Interest Calculations Showing the Amount of Interest Due at Each Interest Paying Period on the Entire $60,000,000 Bond Issue Plus $98,000.000 of the $100,000,000 Bond Issue Sold to December 31, 1929	118	135
59.	Statement of Federal Aid Funds Allotted by the United States Government to Illinois, 1917 to 1931, Inclusive	118	136
60.	Schedule of Motor Fee Receipts by Secretary of State	121	136
61.	Schedule of Motor Fee Receipts by Secretary of State	121	137
62.	Schedule of Motor Fees by Counties as Collected by Secretary of State	121	137, 138
63.	Statement Showing Collections of the Division of Highways and Sources from which Collected, January 1, 1929 to December 31, 1929	121	138

No.		Text on Page.	Table on Page.
64.	Statement Showing Road Fund Revenue Deposited in the State Treasury by Months During the Calendar Year 1929	121	139
65.	Road Fund Revenue Deposited in State Treasury	121	139
66.	Appropriations Payable From Road Fund	121	140
67.	Expenditures from the Road Fund, 1914 to 1929	121	141, 142
68.	Statement Showing Road Fund Balances, Receipts and Expenditures by Months for the Calendar Year 1929	121	142, 143
69.	Highway Bond Retirement and Interest Calculations on All Series of $60,000,000—4% Bonds	121	143
70.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 1—$5,000,000—4% Bonds	121	144
71.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 2—$6,000,000—4% Bonds	121	144
72.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 3—$6,000,000—4% Bonds	121	145
73.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 4—$6,000,000—4% Bonds	121	145
74.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 5—$7,000,000—4% Bonds	121	146
75.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 6—$6,000,000—4% Bonds	121	146
76.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 7—$6,000,000—4% Bonds	121	147
77.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 8—$9,000,000—4% Bonds	121	147
78.	$60,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 9—$9,000,000—4% Bonds	121	148
79.	Bond Fund Revenue Deposited with State Treasurer Derived from Sale of $60,000,000 Bond Issue	121	148
80.	Appropriations Payable from $60,000,000 Bond Issue Fund	121	149
81.	Expenditures from $60,000,000 Bond Issue Fund, 1921 to 1924.	121	149
82.	Highway Bond Retirement and Interest Calculations on All Series of $98,000,000—4% Bonds Sold to December 31, 1929.	124	150
83.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 1—$4,000,000—4% Bonds	124	151
84.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 2—$10,000,000—4% Bonds	124	151
85.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 3—$10,000,000—4% Bonds	124	152
86.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 4—$5,000,000—4% Bonds	124	153
87.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 5—$6,000,000—4% Bonds	124	154
88.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 6—$6,000,000—4% Bonds	124	155
89.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 7—$7,000,000—4% Bonds	124	156
90.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 8—$13,000,000—4% Bonds	124	157
91.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 9—$9,000,000—4% Bonds	124	158
92.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 10—$7,000,000—4% Bonds	124	159
93.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 11—$10,000,000—4% Bonds	124	160
94.	$100,000,000 Bond Issue Highway Bond Retirement and Interest Calculations—Series No. 12—$11,000,000—4% Bonds	124	161
95.	Bond Fund Revenue Deposited with State Treasurer Derived from Sale of $98,000,000 of the $100,000,000 Bond Issue	124	161
96.	Appropriations Payable from $100,000,000 Bond Issue Fund	124	162
97.	Expenditures from $100,000,000 Bond Issue Fund, 1925 to 1929	124	162
98.	Statement Showing $100,000,000 Bond Fund Balances, Receipts and Expenditures by Months for the Calendar Year 1929	124	163
99.	Appropriations Payable from General Revenue Fund as made by the 54th, 55th, and 56th General Assemblies	124	164
100.	Statement Showing Expenditures from 55th G. A. and 56th G. A. Revenue Fund Appropriations During the Calendar Year 1929	124	165
101.	Statement Showing Revenue Fund Receipts and Expenditures by Months for the Calendar Year 1929	124	166
102.	Statement Showing Motor Fuel Tax Fund Revenue Deposited in State Treasury from August 1, 1929 to December 31, 1929	124	166
103.	Appropriations Payable from Motor Fuel Tax Fund as made by the 56th General Assembly	124	166
104.	Statement Showing Expenditures from the Motor Fuel Tax Fund by the Department of Finance from August 1, 1929 to December 31, 1929	124	166

No.		Text on Page.	Table on Page.
105.	Statement Showing the Amount Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, House Bill 766	126	167
106.	Statement Showing the Amounts Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, House Bill 867	126	168
107.	Statement Showing the Amount Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, House Bill 822	126	169
108.	Statement Showing Amounts Appropriated for Refunds to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System, Senate Bill 515	126	170
109.	Statement Showing Amounts Refunded to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System from Appropriations of $3,000,000, S. B. 395	126	171
110.	Statement Showing Amounts Refunded to Counties for Their Share of Cost of Section Incorporated in the State Bond Issue System from Appropriations of $2,500,000, S. B. 311	126	171
111.	Statement Showing the Amounts Refunded to Counties for Their Share of Cost of Sections Incorporated in the State Bond Issue System to December 31, 1929	126	172, 173
112.	Statement Showing Total Refunds to Municipalities from July 1, 1925 to December 31, 1929	126	174

ILLUSTRATIONS.

Fig.		Text on Page.	Figure on Page.
	Intersection of Routes 7 and 29 near DePue, Bureau County		Frontispiece

INTRODUCTION.

1.	Chart Showing Roads Constructed on State Highway System from 1914 to 1929, Inclusive	1	2

BUREAU OF DESIGN.

Road Section.

2.	Graphs Showing Unit Price Range on Principal Items in Highway Construction During 1929	14	12
3.	Graphs Showing Unit Price Range on Principal Items in Highway Construction—1919 to 1929, Inclusive	14	13
4.	Original Location of Portion of Route 33 in Vicinity of Crooked Creek Between Newton and Willow Hill	16	15
5.	Relocation of Portion of Route 33 in Vicinity of Crooked Creek Between Newton and Willow Hill	16	15
6.	Original Location of Portion of Route 3 Between White Hall and Carrollton	16	16
7.	Relocation of Portion of Route 3 Between White Hall and Carrollton	16	16
8.	Typical Cross Sections in Use—January 1, 1929 to December 31, 1929	17	18
9.	Typical Cross Sections in Use—January 1, 1929 to December 31, 1929	17	19

Bridge Section.

10.	Bridge on Route 51 Over Calumet-Sag Channel	32	33
11.	C. B. & Q. Overhead at Oregon	32	33
12.	Deck Truss Bridge at Mt. Carroll	34	33
13.	Channel Span—Illinois River Bridge at LaSalle	34	35
14.	Illinois River Bridge at LaSalle	34	35
15.	Illinois River Bridge at Pekin	34	35
16.	Route 10 West of Danville	34	37
17.	Route 36 East of Pittsfield	36	37
18.	Bridge Over the Embarrass River East of Lawrenceville	36	37
19.	Kaskaskia River Bridge at New Athens	36	38
20.	Route 146 at Dixon Springs	36	38
21.	An Open Spandrel Arch—Route 146	36	38

BUREAU OF CONSTRUCTION.

22.	Curves Showing Progress of Pavement Construction During 1929 in Comparison with the Average from 1920 to 1929, Inclusive.	41	41
23.	Curve Showing Average Daily Output of Concrete in Square Yards from 1921 to 1929, Inclusive	41	42
24.	Curve Showing Weekly Progress in Pavement Construction During 1929	41	43
25.	Cost Analysis Diagram for Each $1.00 Expended for 18 Foot Concrete Pavement from 1922 to 1929, Inclusive	43	44
26.	Cost Analysis Diagram for Each $1.00 Expended for 18 Foot Concrete Pavement During 1929	43	44
27.	A Novel Method of Handling Rock Excavation, Route 146, West of Golconda	46	47
28.	Excavation by Modern Equipment and Construction Methods	46	47
29.	Route 109 near Grafton. Heavy Grading Through Rock Cut	46	48
30.	Channel Change in Pecatonica River, Route 74 near Freeport	46	48
31.	Pouring Concrete Piles for Approach to Illinois River Bridge at Florence	49	49
32.	Curing Concrete Piles for Approach to Illinois River Bridge at Florence	49	49
33.	Driving the Concrete Piles for Approach to Illinois River Bridge at Florence	49	50
34.	Piles in Place with Concrete Cap for Approach to Illinois River Bridge at Florence	49	50
35.	Placing the Steel Floor System for Approach to Illinois River Bridge at Florence	49	50
36.	Approach to Illinois River Bridge at Florence Showing Concrete Floor and Construction of Concrete Handrail	49	51
37.	Grade Separation over Wabash Railroad on Route 160 near Carpenter	51	51
38.	Riprap Used to Prevent Wash on Side Slopes, Route 107 near Louisiana	53	53
39.	State Bond Issue Pavement Widened Through a Village by Local Authorities	41	57

Fig.		Text on Page.	Figure on Page.
40.	Widened Intersection in Metropolitan Area Around Chicago	41	57
41.	A 40 Foot Pavement Construction Inside Metropolitan Area Around Chicago	41	57
42.	A 40 Foot Pavement Constructed Adjacent to Metropolitan Area Around Chicago	41	58
43.	Route 40, Carroll County, Before Construction	..	58
44.	Route 40, Carroll County, After Construction	..	58
45.	Portion of Route 121 Before Construction	..	59
46.	The Portion of Route 121 Shown in Figure 48, After Construction	..	59
47.	Special Baffle Walls to Prevent Ditch Wash	39	59
48.	Heavy Retaining Wall Built to Prevent Sliding of a Fill in Starved Rock Park, LaSalle County	39	60
49.	Concrete Slope Wall to Protect Fill Against Stream Wash	39	60
50.	Special Gutter Section Outlet to Prevent Shoulder Wash on Heavy Grades	39	60

BUREAU OF MAINTENANCE.

Fig.		Text on Page.	Figure on Page.
51.	Chart Showing Division of Mileage of Surfaced Roads Maintained for the Calendar Year of 1929	76	76
52.	Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on Surfaced Roads for the Calendar year 1929	78	81
53.	Chart Showing Division of Costs of the Bureau of Maintenance on Surfaced Roads by Cost Components for the Calendar Year 1929	78	81
54.	Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on 7,284.89 Miles of P. C. Concrete Roads for the Calendar Year 1929	82	83
55.	Chart Showing Division of Costs of the Bureau of Maintenance by Classification of Work on 203.38 Miles of Brick Roads for the Calendar Year 1929	82	83
56.	Chart Showing Division of Mileage of Detour Roads Maintained for the Calendar Year 1929	82	91
57.	Chart Showing Division of Costs of Maintaining Detours, Unpaved and Temporary Routes for the year 1929	90	91
58.	Chart Showing Division of Costs of the Bureau of Maintenance on Detours, Unpaved and Temporary Routes by Cost Components for the Calendar Year 1929	90	95
59.	Chart Showing Distribution of Snow Fall in Illinois During the Calendar Year 1929	93	96
60.	Snow Drift on a State Bond Issue Route. December, 1929	95	98
61.	Moving a Snow Drift from a State Bond Issue Route, December, 1929	95	98
62.	Pavement Markings and Warning Sign at a Railroad Crossing	99	99
63.	Marker Signs	99	100
64.	Caution Signs	99	101
65.	Caution Signs	99	102
66.	Caution, Warning and Restriction Signs	99	103
67.	Direction and Information Signs	99	104
68.	Chart Showing Division of Costs of Bureau of Maintenance According to Activities for the Calendar Year 1929	106	107
69.	Chart Showing Source of Expenditures and Total Cost of the Bureau of Maintenance for the Calendar Year 1929	106	108
70.	Chart Showing Division of Costs of State Highway Maintenance Police for the Calendar Year 1929	110	111

BUREAU OF AUDITS.

Fig.		Text on Page.	Figure on Page.
71.	Accounting Classification and Flow Chart	114	115
72.	Chart Showing Division of Revenues by Funds, 1911 to 1929, Inclusive	118	119
73.	Chart Showing Division of the Combined Expenditures from the Road Fund, $60,000,000 Bond Fund and $100,000,000 Bond Fund, 1914 to 1929, Inclusive	118	119
74.	Chart Showing Annual Principal and Interest Payments on $60,000,000 Bond Issue and on $98,000,000 of the $100,000,000 Bond Issue Sold to December 31, 1929	118	120
75.	Chart Showing Division of Road Fund Revenues Exclusive of Gas Tax, 1911 to 1929, Inclusive	121	122
76.	Chart Showing Division of Road Fund Expenditures, 1914 to 1929, Inclusive	121	122
77.	Chart Showing Proceeds of Sales of $60,000,000 Bond Issue by Years, 1921 to 1924, Inclusive	121	123
78.	Chart Showing Division of Expenditures of Funds Derived from the Sale of the $60,000,000 Bond Issue, 1921 to 1924, Inclusive	121	123
79.	Chart Showing Proceeds from the Sale of $98,000,000 of the $100,000,000 Bond Issue by Years, 1924 to 1929, Inclusive	124	125
80.	Chart Showing Division of Expenditures of Funds Derived from the Sale of $98,000,000 of the $100,000,000 Bond Issue, 1925 to 1929, Inclusive	124	125

DIVISION OF HIGHWAYS.

Frank T. Sheets, *Chief Highway Engineer.*

I. INTRODUCTION.

This report summarizes the work accomplished by the Division of Highways during the calendar year ending December 31, 1929, and is submitted as a part of the Administrative Report required under Section 25, of the Civil Administrative Code.

The Division of Highways, which is a part of the Department of Public Works and Buildings, has immediate control and supervision over the location, construction and maintenance of State highways. It is charged with the administration of the provisions of the $60,000,000 Bond Issue Act of 1918, the $100,000,000 Bond Issue Act of 1924, the General supervision of work constructed on the State Aid System by the counties under Section 15-d of the State Aid Act, and with the general supervision of all work made possible by the Motor Fuel Tax Law. It also acts in an advisory capacity to the counties and townships in connection with the improvement of roads under their jurisdiction.

The executive officers are the Superintendent of Highways and the Chief Highway Engineer. They are assisted by a corps of bureau chiefs located in Springfield. In addition, there are nine district engineers working under the general direction of the executive officers and the bureau chiefs. The bureaus are designated as the Bureau of Design, which is divided into a road section and a bridge section; the Bureau of Construction; the Bureau of Maintenance; the Bureau of Materials and the Bureau of Audits. The district engineers cooperate with each bureau chief in the conduct of the work which concerns that bureau.

During 1929 a total of 752.41 miles of pavement were completed, of which 624.40 miles were on the State bond issue system. The remaining 128.01 miles were completed under State supervision by the counties on the State aid system under Section 15-d of the State Aid Law. With the exception of 1.83 miles of gravel, all of the 752.41 miles completed were of rigid type construction. The mileage of pavement which has been completed each year since 1914 is shown in Figure 1.

The construction during 1929 of 88.52 miles of pavement in the metropolitan area adjacent to the City of Chicago practically doubled the mileage of wide pavement available in this area. The continuance of the program of the construction of wider pavements near Chicago will do much towards relieving the inadequate traffic conditions which now exist.

The bridge building program was somewhat smaller during 1929 than during previous years, but plans were prepared for 2,020 bridges and culverts. Contracts were awarded for 209 bridges and culverts and 215 bridges were completed. The largest projects for which plans were prepared were the Galena bridge at Galena, the DesPlaines River bridge on Route 18 at Ogden Avenue and the Wabash River bridge at Mt. Carmel. The largest bridges placed under contract were the bridge over the Kaskaskia River, near Carlyle, and the Peoria Avenue Bridge across the Rock River at Dixon. Material progress was made on the Illinois River bridges at LaSalle, Pekin and Florence. These constitute three of the largest bridge projects ever undertaken by this department. The new lift bridge at LaSalle was opened to traffic December 1, 1929, and the bridges at Pekin and Florence should be completed during the early part of 1930.

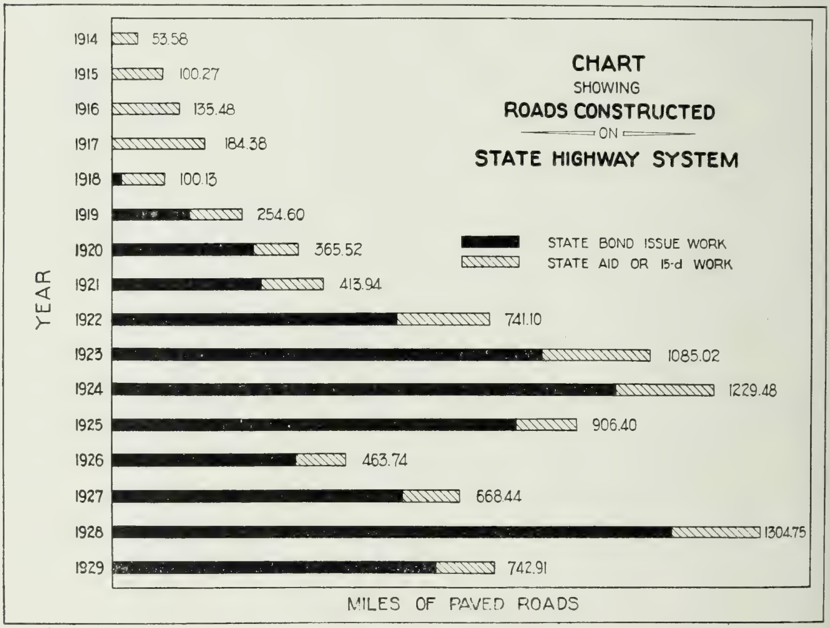


Figure 1.

The four State-owned construction outfits completed 38.24 miles of pavement during 1929. This work was widely separated, the 25 sections constructed being distributed over practically all sections of the State. These State-owned outfits are not operated for the purpose of competing with contract work, but to perform work which cannot be economically constructed by contract due to some physical condition, to try out new methods of construction, to secure first hand information regarding costs of construction, and to construct small gaps and structures not attractive to contractors because of the small amount of work involved.

When Governor Louis L. Emmerson took office in the early part of January, 1929, practically all of the unsold bonds of the second bond issue of $100,000,000, authorized by the General Assembly and approved by the people for bond issue road construction, had been obligated by construction contracts. The unsold bonds at this time amounted to $23,000,000. In addition, all moneys which would be available from the road fund for construction during 1929, consisting of surplus motor fees and federal aid allotments, had also been obligated by existing contracts. The State therefore was face to face with the problem of either providing additional funds for the continuance of its highway construction activities or permitting these activities to lapse.

In the early part of February, 1929, the records of the Division of Highways showed that there had been completed 6,139 miles of pavement on the 9,800 mile State bond issue system. There was under contract on the State bond issue system 600 miles of pavement, 220 miles of grading, and 200 bridges for completion during 1929. The estimated cost of uncompleted work was $31,015,000. There had been expended for bond issue construction to January 1, 1929, a total of $233,540,559, derived from the following sources in the following amounts:

$ 60,000,000 Bond Issue System	$ 58,458,312.00
$100,000,000 Bond Issue System	74,652,120.00
Motor fees and Federal aid	100,430,127.00
Total	$233,540,559.00

The sum of the amounts expended and required to complete existing contracts on the State bond issue system was $264,555,559.00.

As stated above, existing contracts obligated practically all of the remaining unsold bonds amounting to $23,000,000 and all funds available for construction during 1929 from the road fund. Upon the expenditure of these available funds and the completion of the work under contract, it was estimated that there would remain uncompleted a total of approximately 3,000 miles on the State bond issue system. The annual collection for motor fees and Federal aid total about $18,000,000. To pay the principal and interest on outstanding road bonds, a total of about $7,500,000 per annum is required; $4,000,000 per annum is required for maintenance and policing of the highways; and an additional $500,000 for miscellaneous purposes. There remains, therefore, approximately $6,000,000 per annum for new construction on the bond issue system or about enough to construct 200 miles of pavement per year. To complete the 3,000 miles of unfinished bond issue pavements approximately $120,000,000 will be required; for grade separations and widening near large centers of population at least $25,000,000 would be needed; or, a total of approximately $145,000,000 would be required to complete the system. In other words, on the basis of the funds in sight and without the provision of additional funds, the completion of the State bond issue system would be delayed for approximately twenty years.

Governor Louis L. Emmerson upon taking office recognized these facts and in his inaugural address delivered January 14, 1929, reviewed the road situation in some detail. He made the statement that Illinois is morally obligated to build the roads provided in the bond issue system and to do it as quickly as possible. Further, that the routes are designated in the enabling legislation—the two State Bond Issue Road Acts

—and that the honor of Illinois requires the fulfillment of these contracts with the people. He also mentioned that it was highly important to increase the efficiency of the roads now constructed by widening the main arteries entering into the larger centers of population and to work out a plan for the surfacing of the secondary roads so as to extent the benefits of hard roads to communities which do not now have them. He expressed the belief that a financial plan could be devised for accomplishing all of this without imposing upon the people the burden of another bond issue, without levying upon the tax payer, and without hardship upon the owners of automobiles. While he did not presume to make specific recommendations as to the method of increasing the revenue for road building, he suggested that the Legislature give careful consideration to the feasibility of a gasoline tax, most of which would go to the State, but part of which would be returned to the counties for permanent improvement of secondary roads under State supervision.

The Legislature recognized the advisability of continuing highway construction activities in Illinois, and after careful consideration, passed on March 25, 1929, the "Motor Fuel Tax Law," "An Act in relation to a tax upon the privilege of operating motor vehicles upon public highways, based upon the consumption of motor fuel therein, and making certain appropriations in connection therewith." The essential features of this Act are as follows:

1. It places a tax upon the privilege of operating a motor vehicle upon the public highways, based upon the consumption of motor fuel therein. The amount of this tax is 3 cents per gallon of motor fuel.
2. In effect, the tax is collected at the source or from the wholesaler rather than the retailer.
3. The Department of Finance is the collecting agency.
4. Exemption is made of motor fuel used for any purpose other than operating a motor vehicle upon the public highways of the State.
5. The proceeds of the tax of 3 cents per gallon are divided as follows:
   Two-thirds of the net proceeds go to the State for the improvement of the State bond issue road system.
   One-third goes to the counties for the construction, under State supervision, of permanent improvements on the State aid roads.
6. The county's share is allotted in proportion to the motor license fees paid in by each county.

Definite appropriations are made for the cost of collection, refunds, and for the use of the net proceeds.

It is estimated that a motor fuel tax of 3 cents per gallon will yield approximately $21,000,000 per annum. This estimate is based on the actual experience of Illinois in the collection of the gasoline tax in effect during the latter half of 1927, which averaged $4.44 per car per annum for each cent of motor fuel tax collected. The experience of 46 other states having motor fuel taxes shows that the average collection is $4.51 per car per annum for each cent of tax levied per gallon. The average collection in the 14 states having a tax of 3 cents per gallon is $13.95 per car per annum. This agrees closely with the experience of Illinois and checks the accuracy of the estimates of revenue made above. The cost of collection is estimated at $75,000 per year, based on previous experience in Illinois, and the amount of refunds necessary because of non-taxable gasoline is estimated at $600,000 per year.

The motor fuel tax is now generally recognized as the most equitable tax and the most workable plan for raising road revenues that has yet been devised, and it has been adopted by all of the States. The average motor fuel tax rate for the United States is 3.11 cents per gallon, and the tax ranges from a minimum of 2 cents per gallon to a maximum of 5 cents per gallon. The motor fuel tax rates in effect during the early part of 1928 in the various states were as follows:

5 cents per gallon	7 states
4 cents per gallon	12 states
3½ cents per gallon	1 state
3 cents per gallon	14 states
2 cents per gallon	12 states

The motor fuel tax not only taxes the citizens of the State of Illinois but also those motorists from other states who use our highways, thereby making it necessary for them to pay for the road service offered by Illinois. Prior to the passage of the Motor Fuel Tax Law, Illinois collected in motor fees less per car from the motorist than any other state. The revenue per motor vehicle averaged approximately $10 per car, while the average collection for motor vehicle fees and gasoline taxes for the entire United States was $26.55 per car. The average collection in motor license fees alone for the United States during the year 1928 was $13.28 per car, or more than $3.00 in excess of that collected in Illinois which at that time had no motor fuel tax. In other words, the Illinois motorist has paid throughout the entire period of road construction a lower rate of special taxes per car than the motorists of any other state, but have received a road service unexcelled in any state in the Union. Even with the 3 cents per gallon tax added to the average motor license fee now paid in Illinois, the average amount collected per motor vehicle will not exceed approximately $23.00 per car, an amount still below the average collection per motor vehicle for the United States at large by some $3.50.

Probably most Illinois motorists do not realize the saving in operating costs on their motor cars which they realize by using paved roads as against unimproved roads. The saving is about 3.6 cents per mile, this figure being based upon authentic and extensive research conducted by the Iowa Engineering Experiment Station in cooperation with the U. S. Bureau of Public Roads. The Illinois motorist need drive his car only 640 miles per year on the State highway system to save in operating costs the amount of his total motor license fee plus gasoline tax for one year. If he chooses to drive more than 640 miles on the State system, he realizes an increasing dividend on his motor vehicle investment in proportion to the mileage which he travels. For example, should he travel 5,000 miles per year on the improved State highway system, the saving in operating cost would be $180.00 per year, or about eight times his annual payment for the privilege of using the road. In addition to this direct saving on the part of the motor car owner, the State highway system provides a benefit to the social and business life of the State, indirect, perhaps, and incapable of evaluation, but nevertheless shared by each individual citizen of Illinois, regardless of whether he owns a motor car or not.

As previously stated, the motor fuel tax of 3 cents per gallon is estimated to yield a revenue of $21,000,000 per year. Under the provisions of the Motor Fuel Tax Law, two-thirds of the revenue is apportioned for use on the State bond issue system and one-third for the construction of permanent improvements on the State aid or secondary system of highways. Under this apportionment of the revenue, the State's share of the motor fuel tax will be about $14,000,000 per year, which, added to the $6,000,000 per year available for construction from surplus motor license fees and Federal aid funds, makes available a total for construction of about $20,000,000. It is estimated that this revenue will provide sufficient funds to complete the entire bond issue system, together with the necessary grade separations and widening near large centers of population, in a period of about seven years and that the annual construction program will be from 550 to 600 miles per year, depending on the type of work constructed and the economic conditions prevailing at the time the contracts are let. The amount apportioned to the counties, totaling approximately $7,000,000 per year, will be allotted in proportion to the motor license fees paid by each county. These funds will enable the counties to improve from 200 to 300 miles of road per year depending upon the character of the work performed, and will bring the total permanent highway program to between 800 and 900 miles per year.

One of the greatest problems which the State has had to face during the past few years is that of handling the ever increasing traffic congestion in the metropolitan area adjacent to the city of Chicago. To relieve this condition it will be necessary not only to construct the new roads provided under the $100,000,000 bond issue road act, but to widen many of the existing roads, and to construct grade separations between important traffic arteries. Recognizing this, Governor Emmerson and the officials of the Department of Public Works and Buildings arranged a conference with the officials of public, semi-public, and civic organizations of Cook County and the city of Chicago to discuss the program of activity which could best be undertaken by the State of Illinois under present laws and available appropriations to give the greatest measure of relief to this traffic problem. As a result of this conference a committee was appointed to make recommendations as to a definite construction program for the guidance of the State. The problem was attacked in this manner, because it was felt that such a committee represented the best thought on the manner in which highway and street improvement should be carried on in the metropolitan area to give the greatest measure of relief, and that its recommendations would be of great assistance to the State in formulating its program of construction. The committee has made its recommendations, and the State has outlined a program which it is hoped will in some measure relieve the traffic difficulties now existing in this area.

The Motor Fuel Tax Law has made available a method of financing which provides a stable, steady uniform rate of progress of highway construction which will result in a rational development of highway facilities from year to year and at the same time stabilize and provide more satisfactory conditions in the highway construction industry than have heretofore prevailed.

II. BUREAU OF DESIGN.

The Bureau of Design directs the execution of the preliminary work necessary before actual construction operations can be started. This includes the location of the highways, the design of the pavement and structures, and placing the work under contract. This work is administered through a Road Section and a Bridge Section, the Engineer of Design exercising general supervision over the work of both sections.

A. Road Section.

1. DUTIES.—The Road Section has supervision over:

a. The work on the Bond Issue and Federal Aid Systems which must be done prior to actual construction. This work includes:

1. The formulation of policies of design for roads.
2. The making of reconnaissance surveys and other investigations necessary for the selection of final locations.
3. The making of final surveys.
4. The preparation of plans and estimates.
5. The preparation of right-of-way plats.
6. The dedications for right-of-way and supervision of its acquirement.
7. The advertising for, receiving of, and analyzing of bids.
8. The awarding and execution of contracts.
9. The separation of grades at intersecting highways and at intersections between highways and railroads.

b. Refunds to counties and municipalities for work constructed by them and utilized in the State-wide system.

c. The location of State aid roads.

d. The checking and approval of all resolutions, plans, estimates, and contracts for work to be performed by the counties on their State aid systems under the provisions of the State Aid Act.

e. The preparation of maps for free distribution to the traveling public.

f. Special duties relative to the design of roads.

Obviously, several of these activities, such as the making of final surveys, acquiring right-of-way, etc., require field work. Such activities are performed by the various district organizations under the direction and supervision of the Bureau of Design.

2. SURVEYS AND PLANS.—The initial steps in a road building program are:

a. The Reconnaisance Surveys.—These surveys are usually made by the Bureau Chiefs and District Engineers, to secure such information as is necessary in deciding the ultimate location of a road, or data regarding the population to be served, the traveling public, length to build, safety and the relative costs for each of the probable locations.

b. The Public Hearing.—Where more than one location is feasible from an engineering standpoint, it is the policy of the department to hold a public hearing at which the local interests and general public are given an opportunity to present arguments in favor of the location which they prefer.

c. The Detailed or Final Survey.—The final location having been selected, a detailed survey is made of the proposed location.

d. The Plans and Estimates.—The plans and estimates for the proposed work are prepared from the detailed survey data.

e. The Bids.—When the plans and estimates have been prepared, the right-of-way secured, and the funds are available, bids are advertised for, received and analyzed.

f. The Contract.—The awarding and execution of the contract is based on the analysis of the bids.

When the reconnaisance surveys authorized in 1929 are completed, there will remain only 285 miles to be studied on the $100,000,000 Bond Issue system. Final surveys had been made and plans were available on January 1, 1929, for approximately 451 miles of paving and 87 miles of grading which had not been placed under contract. During 1929, additional final surveys and plans were completed for 236 miles of pavement and 58 miles of grading and new surveys are being ordered and the plans prepared as rapidly as the engineering forces can complete the work. As only 191 miles of pavement and 64 miles of grading were awarded during 1929, there remained on December 31, 1929, a total of 496 miles of pavement and 81 miles of grading for which plans are ready and which can be placed under contract as funds become available.

3. CONTRACTS AWARDED.—The contracts for road work which have been awarded directly by the State from 1914 to 1929, inclusive, on the State-wide and Federal Aid systems, are shown in Table 1. It will be noted from an inspection of this table that the amount of work awarded during 1929 falls somewhat short of that awarded

TABLE 1—FEDERAL AID AND STATE BOND ISSUE CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1918	------	------	------	------	------	8.36	$ 201,619.40	$24,131.59
1919	36.52	$ 715,713.18	$19,597.84	27	$ 120,401.77	444.95	14,701,053.23	33,039.79
1920	135.96	2,086,198.59	15,344.21	98	1,437,432.87	47.57	1,935,592.30	40,692.77
1921	270.71	1,801,712.36	6,655.51	145	1,488,289.34	652.47	18,575,283.31	28,469.18
1922	138.03	803,059.87	5,818.01	83	901,884.69	472.05	12,634,976.84	26,766.18
1923	278.75	2,779,339.04	9,970.72	226	2,934,653.06	868.73	23,123,159.60	26,617.20
1924	163.93	2,013,223.70	12,280.99	84	1,070,387.21	503.54	13,597,135.32	27,003.09
1925	143.78	1,330,186.60	9,251.54	135	2,607,739.92	899.20	23,818,244.21	26,488.26
1926	41.25	529,489.19	12,863.10	62	2,357,421.08	378.00	10,243,739.05	27,099.84
1927	143.26	2,010,988.09	14,037.33	184	2,108,958.81	627.18	18,286,152.06	29,156.15
1928	351.46	4,872,155.40	13,862.49	381	5,324,487.17	1,274.09	37,525,361.41	29,452.67
1929	64.41	823,728.99	12,789.04	62	888,038.03	190.75	5,420,103.09	28,414.25
Total	1,768.06	$19,765,795.01	$11,179.37	1,487	$21,239,693.95	6,366.89	$180,062,419.82	$28,281.06

NOTE—Grading and bridge work shown does not necessarily coincide with the pavement shown. No Federal aid or State bond issue contracts were awarded previous to 1918.

during the last few years. This was due to the fact that all of the $60,000,000 bond issue funds had been expended and practically all of the $100,000,000 bond issue funds had either been expended or obligated prior to January 1, 1929, leaving the Department with a very limited amount of money available for awarding new contracts during 1929.

Since the discontinuance of State aid allotments, all improvements on the State Aid System under the general direction of the State have been performed in accordance with the provision of Section 15d of the State Aid Act. The amount of such work placed under contract from 1916 to 1929, inclusive, is shown in Table 2. The contracts awarded by the various counties during 1929 under Section 15d are shown in Table 3.

TABLE 2—15D CONTRACTS AWARDED.

Year.	Grading.			Bridges.		Pavement.		
	Miles.	Total cost.	Cost per mile.	No.	Total cost.	Miles.	Total cost.	Cost per mile.
1916	--------	--------------	----------	------	--------------	174.58	$2,204,680.94	$12,628.49
1917	25.93	$ 60,658.01	$ 2,339.30	16	$ 5,065.00	37.34	745,962.28	19,977.56
1918	11.00	45,609.17	4,146.29	21	44,179.64	10.84	270,480.54	24,952.08
1919	42.58	167,425.56	3,932.02	25	40,680.00	153.94	4,391,177.96	28,525.26
1920	13.07	104,533.72	7,997.98	10	185,494.87	44.06	1,626,373.67	36,912.70
1921	17.57	100,154.52	5,700.31	4	61,746.82	63.84	1,484,506.53	23,253.55
1922	15.23	102,085.56	6,702.92	87	359,743.96	258.34	5,637,805.33	21,823.20
1923	17.46	185,844.97	10,644.04	22	620,366.61	187.41	3,433,764.03	18,322.20
1924	21.38	221,007.97	10,337.14	65	329,099.57	175.29	3,559,634.26	20,307.11
1925	52.36	533,349.06	10,186.19	38	358,394.54	122.48	2,966,340.07	24,218.98
1926	56.24	665,000.82	11,824.34	11	155,400.98	106.56	3,140,570.97	29,472.33
1927	85.52	1,172,020.46	13,704.64	17	394,995.26	141.39	4,398,115.94	31,106.27
1928	33.82	448,820.13	13,270.84	22	524,626.83	145.58	5,192,790.95	35,669.67
1929	--------	18,604.00	----------	25	569,632.52	126.81	5,010,540.27	39,513.12
Total	392.16	$3,825,113.95	$9,753.96	363	$3,649,426.60	1,748.46	$44,062,743.74	$25,200.88

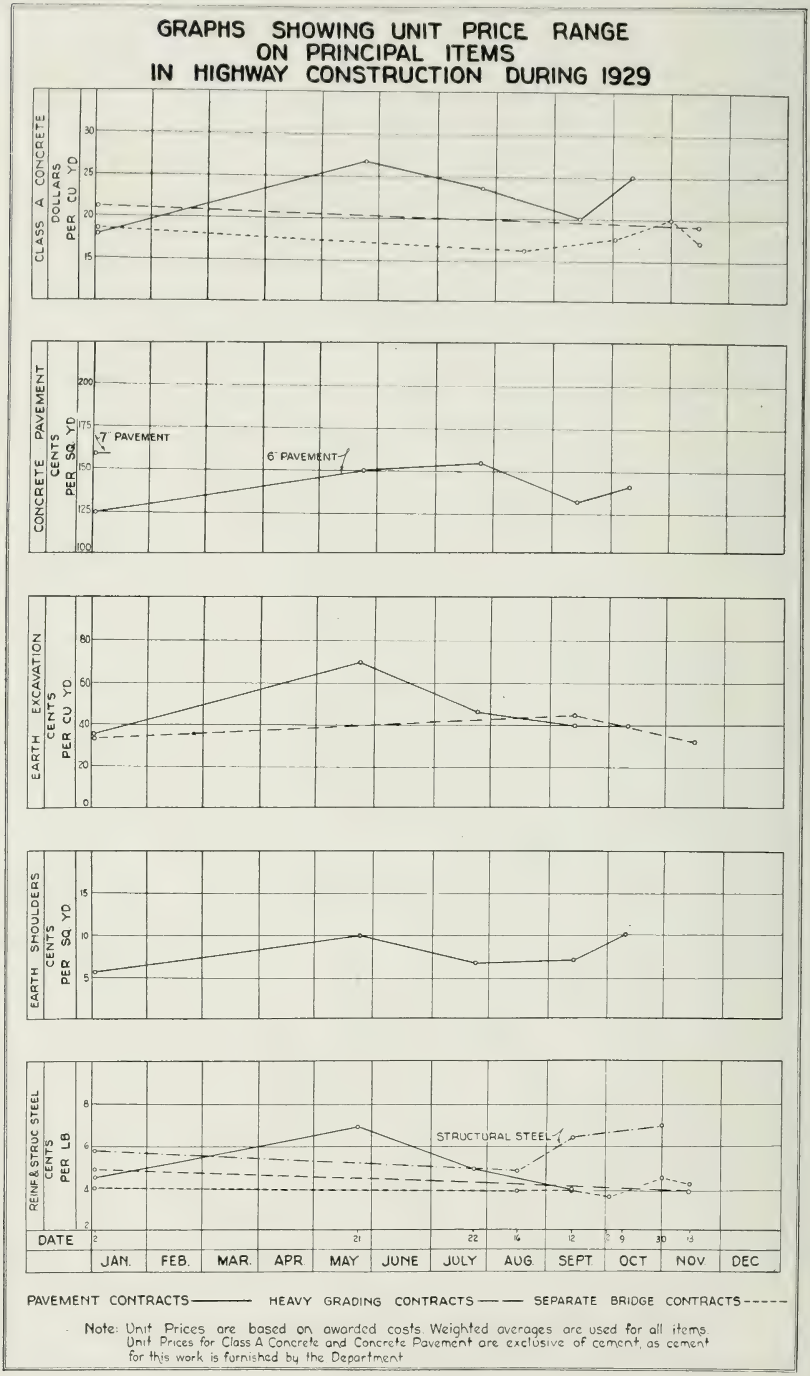
TABLE 3—CONTRACTS AWARDED FOR COUNTY 15D WORK—1929.

County.	Grading.		Bridges.		Pavement.		Total cost of all work.
	Miles.	Total cost.	No.	Total cost.	Miles.	Total cost.	
Adams	--------	--------------	1	$ 6,724.87	1,561	$ 41,071.66	$ 47,796.53
Champaign	--------	--------------	2	19,830.25	5.052	74,180.14	94,010.39
Cook	--------	$18,604.00	9	438,683.50	72.622	3,795,620.73	4,252,908.23
Iroquois	--------	--------------	4	17,396.20	2.766	50,341.57	67,737.77
Kane	--------	--------------	6	25,749.72	--------	--------------	25,749.42
Livingston	--------	--------------	------	--------------	11.486	160,562.85	160,562.85
Rock Island	--------	--------------	------	8,303.40	5.317	166,782.34	175,085.74
Sangamon	--------	--------------	1	9,586.67	.721	21,066.82	30,653.49
St. Clair	--------	--------------	1	12,295.87	5.520	215,401.63	227,697.50
Vermilion	--------	--------------	------	--------------	11.263	224,324.10	224,324.10
Warren	--------	--------------	------	--------------	4.281	34,157.92	34,157.92
Will	--------	--------------	1	31,062.04	6.186	225,284.16	256,346.20
Winnebago	--------	--------------	------	--------------	.032	1,746.35	1.746.35
Total	--------	$18,604.00	25	$569,632.52	126.807	$5,010,540.27	$5,598,776.79

The $60,000,000 Bond Issue Act did not permit the State to extend the roads described through municipalities having a population greater than 2500. A number of cities and villages having a population greater than 2500 could not afford to improve their streets to connect with the State roads constructed to their corporate limits, and the Fifty-fourth and Fifty-fifth General Assemblies enacted legislation making appropriations permitting the State to extend the $60,000,000 roads through such municipalities. The Fifty-sixth General Assembly made an additional appropriation of $500,000 for this purpose, and empowered the Department not only to construct such connections, but also to reconstruct such pavements thru municipalities where, in its opinion, the condition of the existing pavement is unsatisfactory. During 1929, one section was awarded under this appropriation, this section being located on Route 24 in the city of Pekin and consisting of a 20-foot pavement, .994 of a mile in length. The cost of this section was $29,700.52, including the cost of cement which was furnished by the State. Table 4 shows the location, length, and total cost of all construction work which has been performed through municipalities under these appropriations of the last three General Assemblies.

TABLE 4—CONSTRUCTION THROUGH CITIES BUILT FROM SPECIAL APPROPRIATIONS BY THE LEGISLATURE.

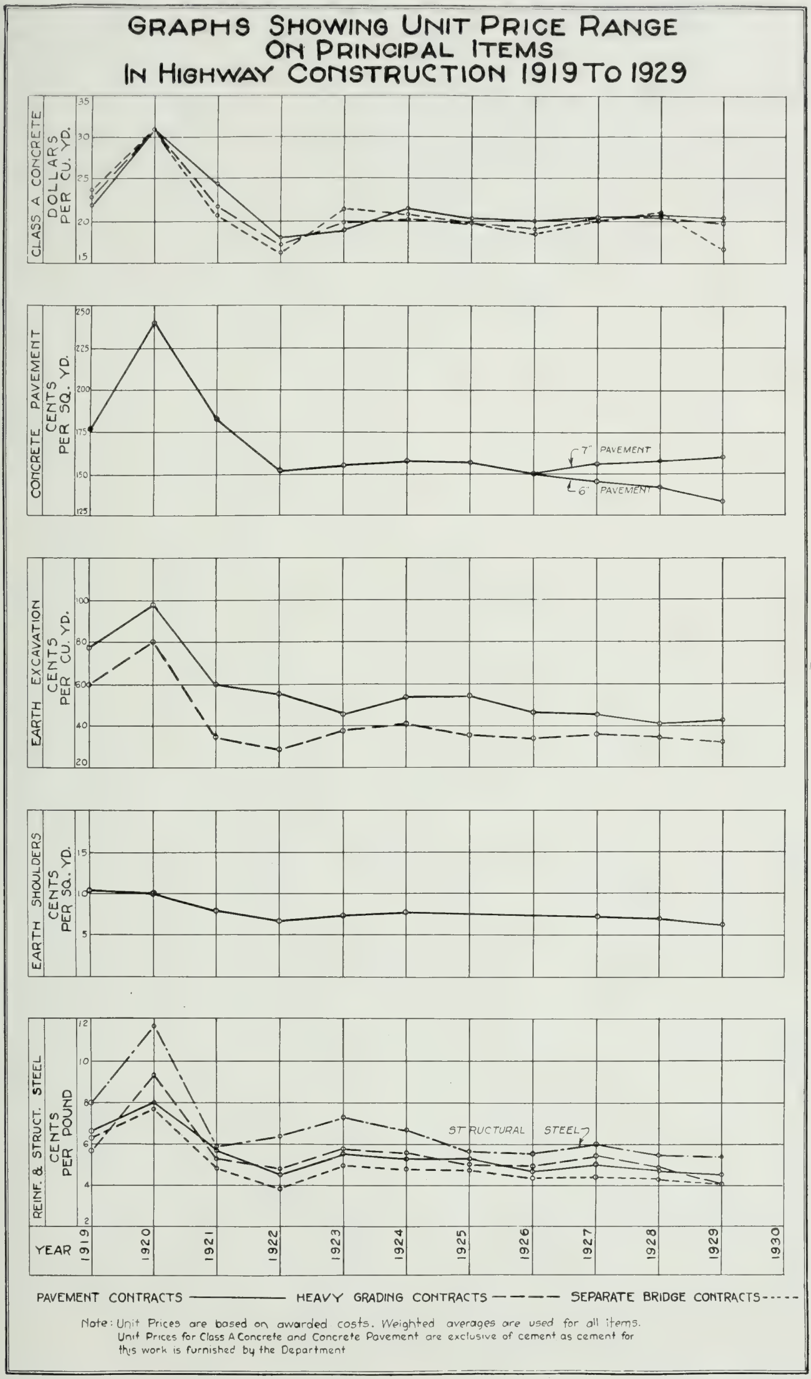
City.	Route.	Miles.	Completed cost.
Abingdon	41	1.286	$53,153.20
Anna	2	1.103	34,374.00
Bushnell	9	.757	23,160.39
Champaign	39	.125	4,801.08
Charleston	16	.226	5,289.08
Clinton	2	.968	31,890.62
Danville	10	.058	1,933.93
Flora	25	.306	8,296.54
Freeport	5	.368	10,380.40
Galena	5	.689	34,500.80
Galva	28	1.130	28,681.53
Geneseo	7	.986	23,834.91
Harrisburg	1	.404	15,293.74
Highland	11	.765	20,842.04
Jerseyville	3 and 38	1.519	38,574.33
Lawrenceville	1	1.020	22,953.65
Litchfield	16	.696	19,820.65
Marseilles	7	1.965	56,586.17
Mattoon	25	.125	3,434.88
Mendota	2 and 18	1.004	28,522.97
Metropolis	1	1.056	29,552.20
Mt. Carroll	40	.447	11,505.92
Mt. Olive	16	1.780	50,036.99
Ottawa	23 and 7	1.001	28,290.52
Pana	24	.723	18,869.82
Paxton	9 and 25	1.162	31,826.76
Pekin	24	.994	29,700.52
Pontiac	4	.867	24,334.64
Robinson	1	.202	10,370.67
Roodhouse	3	1.313	35,409.93
Shelbyville	16	.434	11,853.30
Staunton	4 and 16	1.549	50,818.74
Sullivan	32	.031	1,608.75
Sycamore	23	.099	3,949.80
Vandalia	11	.953	27,618.71
Virden	4	1.647	46,025.97
West Frankfort	37	.363	13,001.75
Whitehall	3	1.962	53,949.26
Total		32.083	$945,049.16


GRAPHS SHOWING UNIT PRICE RANGE ON PRINCIPAL ITEMS IN HIGHWAY CONSTRUCTION DURING 1929

PAVEMENT CONTRACTS ——— HEAVY GRADING CONTRACTS — — SEPARATE BRIDGE CONTRACTS - - - - -

Note: Unit Prices are based on awarded costs. Weighted averages are used for all items. Unit Prices for Class A Concrete and Concrete Pavement are exclusive of cement, as cement for this work is furnished by the Department

Figure 2.



GRAPHS SHOWING UNIT PRICE RANGE
ON PRINCIPAL ITEMS
IN HIGHWAY CONSTRUCTION 1919 TO 1929

Note: Unit Prices are based on awarded costs. Weighted averages are used for all items.
Unit Prices for Class A Concrete and Concrete Pavement are exclusive of cement as cement for this work is furnished by the Department

Figure 3.

In addition to the work on the State-wide and Federal Aid systems the General Assembly, from time to time, makes special appropriations for highway work not included in either of these systems. During 1929, contracts were awarded for the construction of a bridge consisting of 20 reinforced concrete spans and one 180-foot steel span, with graded approaches, over the Kaskaskia River near Carlyle. The cost of this work amounted to $103,481.70, including the cost of cement furnished by the State. Contracts were also awarded for gravel driveways and concrete fords thru the Ogle County Pine Forest State Park at a total cost of $15,654.00.

(a) *Unit Prices.*—As bids are received at the lettings held by this Department from time to time, the unit prices submitted for the principal items of road and bridge work are studied. The information obtained from these studies furnishes an excellent indication of the price trend from letting to letting and from year to year. The contract unit prices of the principal items in connection with the several lettings held during 1929 are shown in Figure 2. On this chart the dates of the lettings are shown at the bottom, while the points on the graphs are plotted from the weighted average unit prices submitted at each letting for the performance of all Federal Aid and State Bond Issue contracts. The comparison of the weighted average unit prices by years from 1919 to 1929, inclusive, is shown in Figure 3. It will be noted from Figure 2 that there was quite a variation in unit prices in connection with the several lettings held during 1929. This is due to the fact that several of the lettings included only a small amount of work, only one short paving section comprising the letting of May 21. It will also be noted from Figure 3, that altho, in general, the prices were somewhat lower, there is very little difference from those of 1928. The fact that only a small amount of work was advertised in 1929 naturally increased the amount of competition, which would tend to lower the unit prices. On the other hand, this tendency was neutralized by the fact that much of the work advertised this year consisted of short sections having long hauls and other difficult construction features. The exception to this is the unit price for Class A Concrete in separate bridge structures. It will be noted that this item took a decided drop from 1928. This can be accounted for by the fact that under our present specifications excavation for bridges is included in the unit price for Class A Concrete, and during 1929 most of the structures advertised for letting consisted of railroad overhead structures, the excavation for which is dry and less hazardous than that necessary for bridges over streams and rivers.

4. DESIGN POLICIES.—The principal change in design policy during 1929 was in connection with sight distance on vertical and horizontal curves. A minimum sight distance of 500 feet is now required; the previous requirement was 400 feet. This change is in accordance with the recommendations of the American Association of State Highway Officials.

Another change in policy dealt with the construction of widened pavements through cities and villages. Formerly a minimum width of 30 feet between curbs was required. This was changed to 36 feet, to provide for two 10-foot lanes of traffic, and an 8-foot lane on either side for parked vehicles.

A new policy was adopted in connection with the construction of gutter sections. It is now required that where gutter sections are used, a ditch must be constructed from the gutter outlet to the nearest point of natural drainage to prevent run-off water from spreading over adjacent lands. Additional right-of-way required for this purpose is obtained as a part of the regular right-of-way.

Our practice in the preparation of estimates of cost for road work was revised to conform with modern construction methods. New estimating tables were prepared, based on actual construction experience, and the various estimating forms were revised to permit these tables to be used in the preparation of cost estimates.

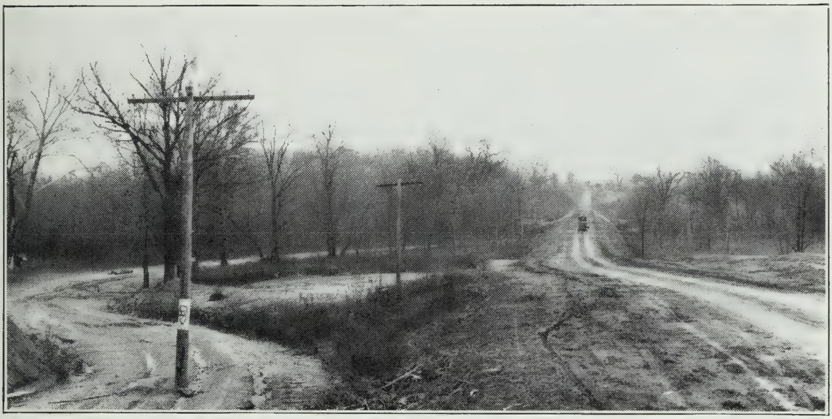


Figure 4.—Original location of portion of Route 33 in vicinity of Crooked Creek between Newton and Willow Hill.

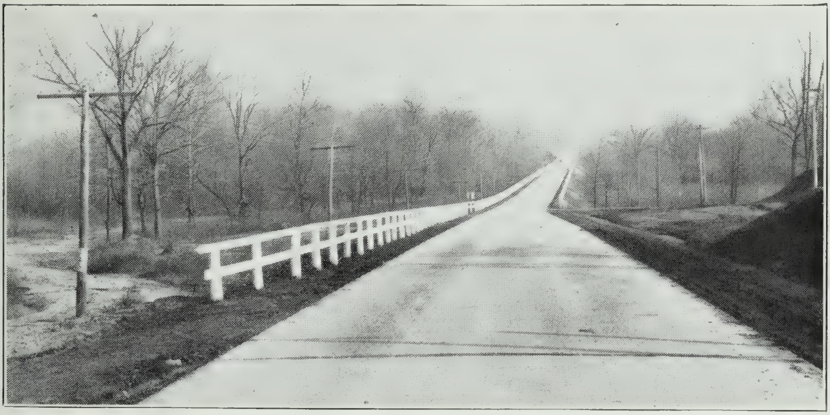


Figure 5.—Relocation of portion of Route 33 in vicinity of Crooked Creek between Newton and Willow Hill.

In the design of modern highways, the matter of horizontal and vertical alignment is given considerable study. Long tangents and smooth, easy horizontal and vertical curves are necessary to present day traffic, and to obtain these features, relocations are often required. Several photographs are included in this report which show some of the steps which have been taken toward securing better alignment. Figure 4 shows the portion of Route 33 between Newton and Willow Hill in the vicinity of Crooked Creek. The old highway is shown at the left, and the relocation made to improve the alignment is shown at the right. Figure 5 shows this road after completion. Figure 6 shows a portion of Route 3 between White Hall and Carrollton prior to relocation. Figure 7 shows the relocation made to eliminate the winding road and to improve the grade line. The old road is shown at the left in this figure.

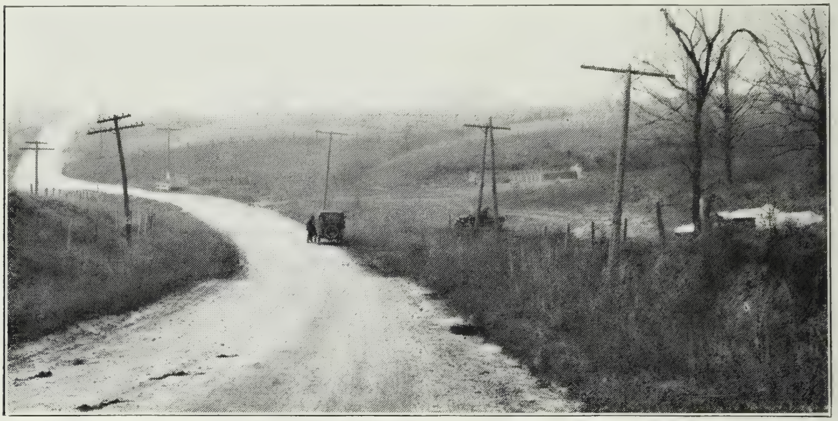


Figure 6.—Original location of portion of Route 3 between White Hall and Carrollton.

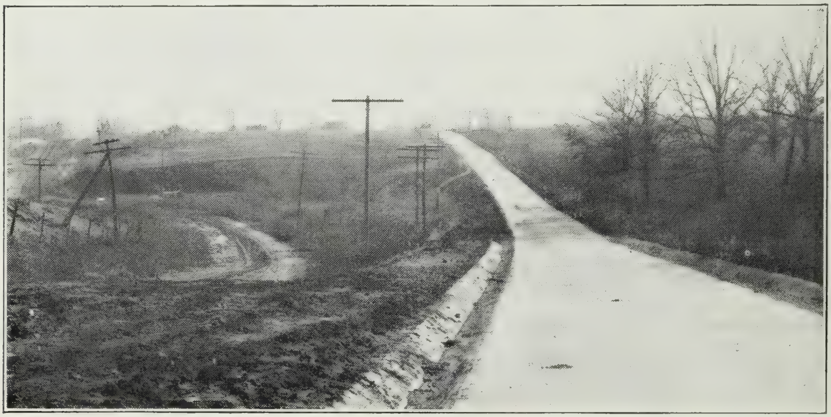


Figure 7.—Relocation of portion of Route 3 between White Hall and Carrollton.

5. PAVEMENT CROSS SECTIONS.—The standard pavement cross sections in use during 1929 are shown in Figures 8 and 9. The 18-foot pavement width was used on the majority of the work placed under contract. The 20-foot width was used near the larger centers of population where heavy truck traffic is anticipated. While Figures 8 and 9 show 18-foot widths only for the bituminous-concrete and bituminous-filled brick pavement, alternate bids were received for the same widths in these types as for portland cement concrete.

6. GRADE SEPARATIONS.—The policy of eliminating dangerous railroad grade crossings on the State-wide system has been continued during 1929. Insofar as it is practical, highway locations which will avoid railroad crossings are selected. Where a railroad crossing becomes necessary, however, an effort is made to effect a separation of grades at all locations where heavy railroad and highway traffic is encountered. Before such a separation can be made, it is necessary that an order be secured from the Illinois Commerce Commission. Prior to presenting the matter to the Commerce Commission, it is the policy of the Department to attempt to reach an agreement with the interested railroad company as to the construction, maintenance details and the division of cost of the project. These matters are often difficult to adjust and frequently much time is consumed in reaching a satisfactory agreement.

One hundred ten grade separations have been completed on the State-wide system, exclusive of those in existence before the construction of the new roads. Table 5 shows the separations completed during 1929. In addition to those completed during 1929, contracts have been awarded in connection with 18 separations, which are now under construction, as shown by Table 6.

TABLE 5—GRADE SEPARATIONS COMPLETED 1929.

Location.				Railroad.	Type of crossing.	Total estimated cost to railroad and State.
Route.	Section.	County.	Near.			
1	K-V	Cook	Riverdale	I. H. B	Over	$334,555.00
3	69-S	Monroe	Burksville	M. & O	Under	36,706.00
4	6	Grundy	Gardner	C. & A	Over	62,268.00
5	3	Cook	Elmhurst	C. & N. W	Under	161,700.00
6	FV-3	Cook	Westchester	C. A. & E	Over	198,000.00
11	45	Clark	Martinsville	Pennsylvania	Under	55,438.00
13	28-S	St. Clair	Church	I. C	Under	51,700.00
18	11-V	DuPage	Naperville	E., J. & E	Over	71,350.00
23	31	LaSalle	Leland	C., B. & Q	Under	47,845.00
24	J	Tazewell	Green Valley	C. & N. W	Under	25,000.00
25	7	Clay	Flora	B. & O	Over	63,580.00
30	7	Peoria	Princeville	A., T. & S. F	Under	37,760.00
39	12	Piatt	Mansfield	Wabash	Over	51,866.00
46	464	Cook	Hillside	I. C	Under	35,950.00
49	142	Will	Peotone	C., M., St. P. & P	Under	19,520.00
54	541	Cook	Elmhurst	C. & N. W	Under	169,000.00
78	134	Fulton	Norris	C., B. & Q	Under	22,948.00
88	123	Stark	Bradford	C., B. & Q	Over	1,842.00
98	108	Fulton	Table Grove	C., B. & Q	Under	47,746.00
99	102	Hancock	Augusta	C., B. & Q	Under	48,900.00
113	109	Kankakee	Kankakee	N. Y. C., K. & S	Under	97,200.00
142	101	Effingham	Watson	I. C	Under	69,640.00
160	133	Madison	Bethalto	C., C., C. & St. L	Over	34,050.00
160	134	Madison	Carpenter	C., C., C. & St. L	Over	36,453.00
160	135	Madison	Carpenter	Wabash	Over	38,720.00
164	119	Tazewell	Mackinaw	I. T. Co	Over	37,140.00
Total estimated cost of work						$1,856,877.00

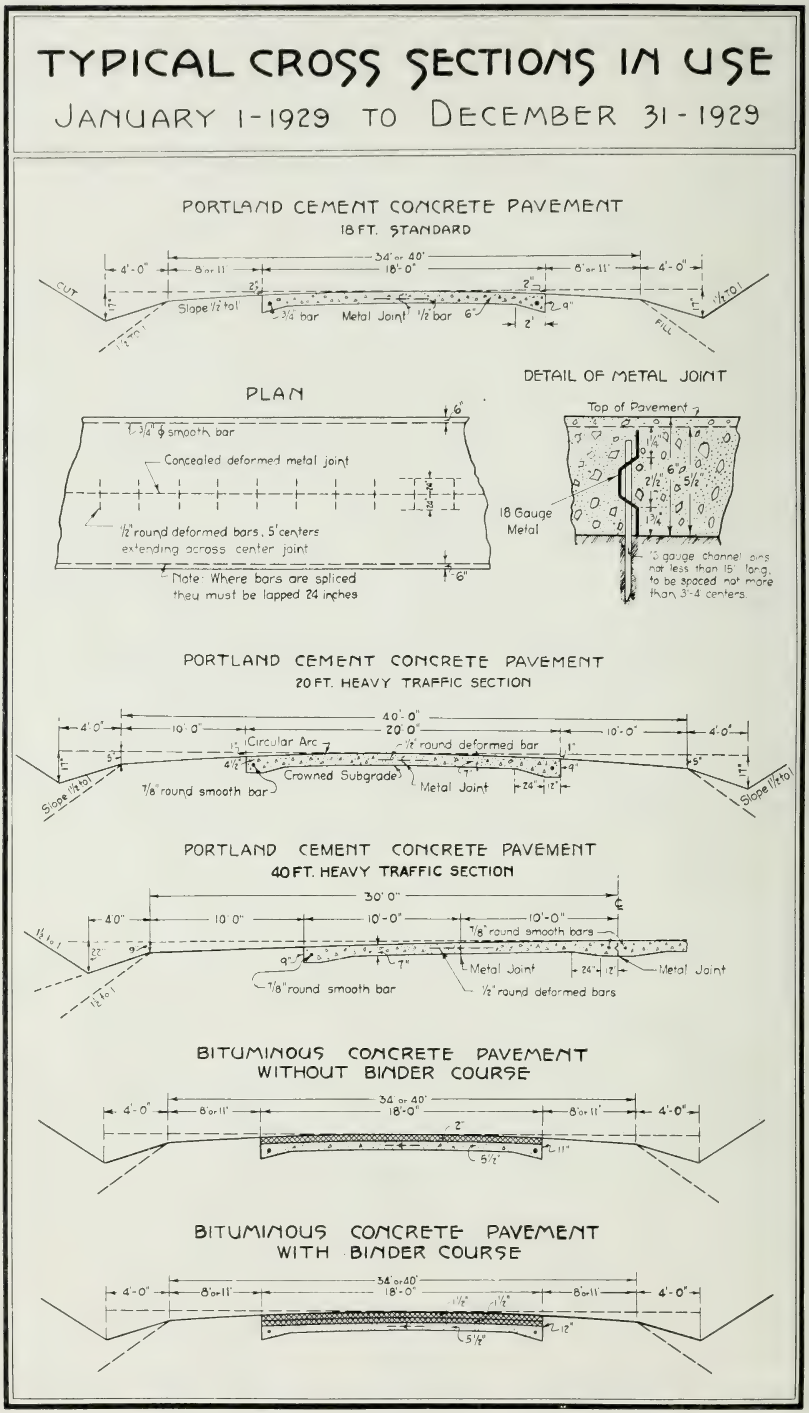

TYPICAL CROSS SECTIONS IN USE
JANUARY 1-1929 TO DECEMBER 31-1929
PORTLAND CEMENT CONCRETE PAVEMENT
18 FT. STANDARD
34' or 40'
4'-0"
8' or 11'
18'-0"
8' or 11'
4'-0"
CUT
1½ TO 1
Slope ½ to 1
2"
¾" bar
Metal Joint
½" bar
6"
9"
2'
FILL
1½ TO 1
PLAN
6"
¾" ɸ smooth bar
Concealed deformed metal joint
½" round deformed bars, 5' centers extending across center joint
Note: Where bars are spliced they must be lapped 24 inches
DETAIL OF METAL JOINT
Top of Pavement
18 Gauge Metal
1¼"
2½"
1¾
6"
5½"
13 gauge channel pins not less than 15" long, to be spaced not more than 3'-4' centers.
PORTLAND CEMENT CONCRETE PAVEMENT
20 FT. HEAVY TRAFFIC SECTION
40'-0"
4'-0"
10'-0"
20'-0"
10'-0"
4'-0"
Circular Arc
½" round deformed bar
1"
5"
4½"
Crowned Subgrade
7"
9"
⅞" round smooth bar
Metal Joint
24"
12"
Slope 1½ to 1
PORTLAND CEMENT CONCRETE PAVEMENT
40 FT. HEAVY TRAFFIC SECTION
30'0"
℄
4'0"
10'0"
10'-0"
10'-0"
⅞" round smooth bars
1½ to 1
22"
9"
7"
⅞" round smooth bar
Metal Joint
½" round deformed bars
24"
12"
Metal Joint
BITUMINOUS CONCRETE PAVEMENT WITHOUT BINDER COURSE
34' or 40'
4'-0"
8' or 11'
18'-0"
8' or 11'
4'-0"
2"
5½"
11"
BITUMINOUS CONCRETE PAVEMENT WITH BINDER COURSE
34' or 40'
4'-0"
8' or 11'
18'-0"
8' or 11'
4'-0"
1½"
1½"
5½"
12"

Figure 8.

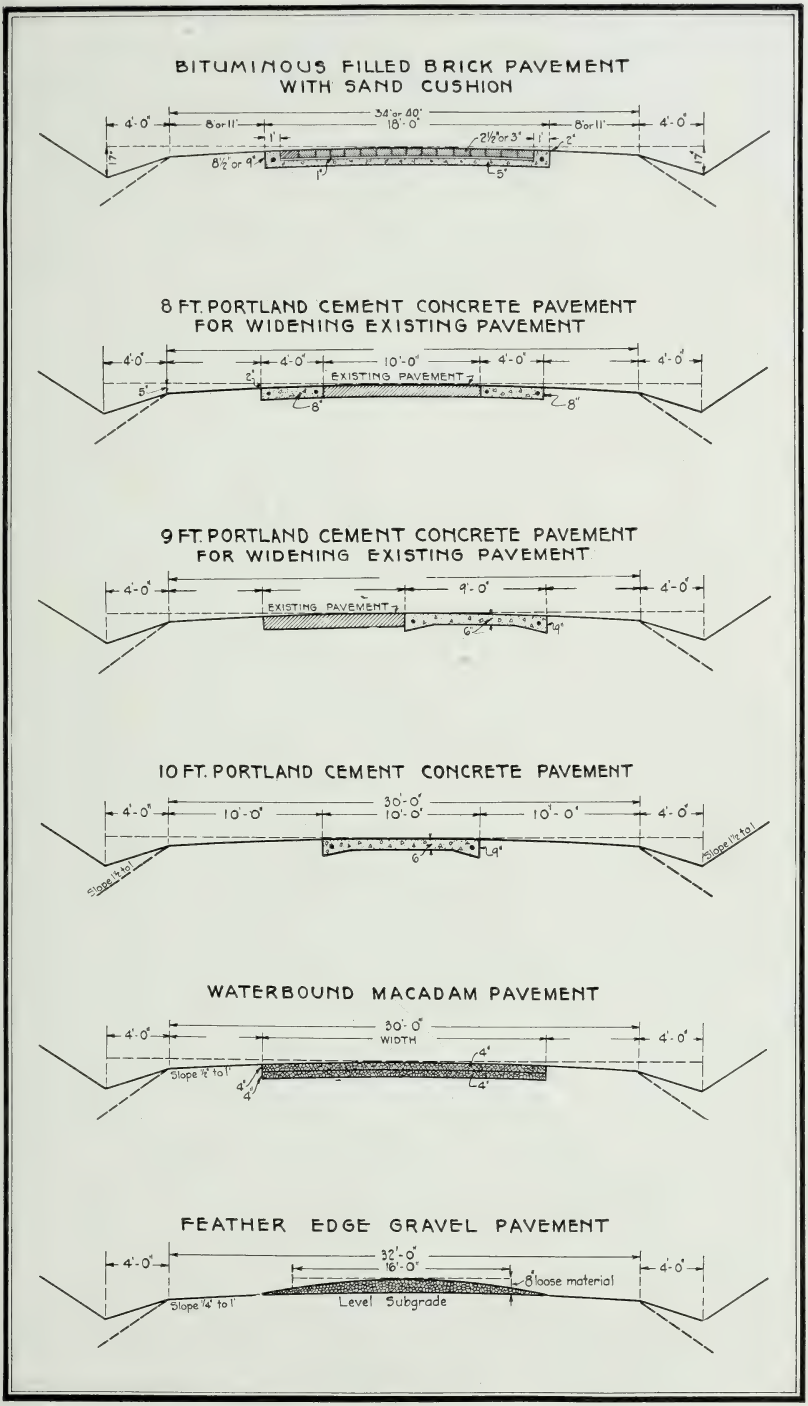

BITUMINOUS FILLED BRICK PAVEMENT WITH SAND CUSHION
34' or 40'
4'-0"
8' or 11'
18'-0"
8' or 11'
4'-0"
1'
2½" or 3"
1'
2"
17"
17"
8½" or 9"
1"
5"
8 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
4'-0"
4'-0"
10'-0"
4'-0"
4'-0"
EXISTING PAVEMENT
2"
5"
8"
8"
9 FT. PORTLAND CEMENT CONCRETE PAVEMENT FOR WIDENING EXISTING PAVEMENT
4'-0"
9'-0"
4'-0"
EXISTING PAVEMENT
6"
9"
10 FT. PORTLAND CEMENT CONCRETE PAVEMENT
30'-0"
4'-0"
10'-0"
10'-0"
10'-0"
4'-0"
6"
9"
Slope 1½ to 1
Slope 1½ to 1
WATERBOUND MACADAM PAVEMENT
30'-0"
WIDTH
4'-0"
4'-0"
Slope ½" to 1'
4"
4"
4"
4"
FEATHER EDGE GRAVEL PAVEMENT
32'-0"
16'-0"
4'-0"
4'-0"
8" loose material
Slope ¼" to 1'
Level Subgrade

Figure 9.

TABLE 6—GRADE SEPARATIONS UNDER CONTRACT BUT NOT COMPLETED.

Location.				Railroad.	Type of crossing.	Total estimated cost to railroad and State.
Route.	Section	County.	Near.			
2	29-S	Marion	Central City	I. C	Under	$ 63,330.00
*2	38-V	Ogle	Oregon	C., B. & Q	Over	50,000.00
*4	J-1	Macoupin	Staunton	C. & N. W	Over	2,000.00
7	8-V	Bureau	Sheffield	C., R. I. & P	Over	58,800.00
10	37-V	Morgan	Jacksonville	C., B. & Q	Over	49,056.00
19	25-S	McHenry	Gary	C. & N. W	Under	64,770.00
29	V	Bureau	Bureau	C., R. I. & P	Over	80,000.00
51	104-S	Will	Frankfort	C., R. I. & P	Under	81,199.00
58	583-S	Cook	N. E. Des Plaines	C. & N. W	Under	88,590.00
61	112	McHenry	Crystal Lake	C. & N. W	Over	40,800.00
64	130V-1	DuPage	W. Chicago	C., A. & E	Over	128,000.00
64	130V-2	DuPage	Ingalton	C. & N. W., E. J. & E	Over	147,390.00
*74	101	Stephenson	Orangeville	I. C	Over	25,000.00
86	106	Whiteside	Galt	C. & N. W	Over	48,410.00
88	121	Bureau	Buda	C., R. I. & P	Over	59,640.00
88	122	Bureau	Buda	C., B. & Q	Over	56,680.00
112	103	Madison	Gard Siding	C., C., C. & St. L	Under	47,570.00
121	105	Tazewell	Morton	Pennsylvania	Over	65,420.00
Total estimated cost of work						$1,156,655.00

* Awarded prior to 1929.

During the year Commerce Commission orders have been obtained for the 19 separations listed in Table 7. Negotiations are under way for a number of other projects for which agreements will probably be concluded in 1930.

7. FEDERAL AID.—The Federal Highway Act, with its subsequent amendments, provides that certain funds are allotted to the various States from year to year for the purpose of constructing Federal Aid roads. Table 8 shows all such allotments which have been made to the State of Illinois.

Table 9 shows the status of Federal Aid on December 31, 1929. From this table it will be noted that there are four distinct steps of Federal Aid procedure, the first of which is the project statement. The project statement is based on preliminary estimates of cost and the amount of federal aid obligated under the statement is, therefore, only approximate. The second step is the project agreement estimate. In this stage actual construction contracts have been awarded and unit costs established, but agreements have not yet been reached with the Federal Government concerning the share of the cost which it will assume. After the project agreement, which covers construction details and the division of cost of the project, has been executed on behalf of this Department and the Federal Government, the work is advanced to the third stage. Under the fourth step, the project has been completed and accepted. The amounts shown under the first three stages on Table 9 therefore show the amount of Federal Aid expected on the various uncompleted projects, while the amount shown under the last stage is the Federal Aid actually received on completed work.

TABLE 7—GRADE SEPARATION CASES SETTLED 1929.

Location.				Railroad.	Type crossing.	I. C. C. case number.	Petition filed.	Final hearing.	I. C. C. order issued.
Route.	Section.	County.	Near.						
3	Miss. Ave.	St. Clair	East St. Louis	I. C.	Under	19191	May 3, 1929	June 20, 1929	June 26, 1929
10	37-V	Morgan	Jacksonville	C., B. & Q.	Over	19335	June 27, 1929	July 18, 1929	July 24, 1929
19	25	McHenry	Cary	C. & N. W.	Under	15473	Aug. 12, 1925	Feb. 6, 1929	Feb. 27, 1929
39	12	Piatt	Mansfield	Wabash	Over	15173	May 25, 1925	Feb. 6, 1925	Feb. 27, 1929
58	583	Cook	N. E. Des Plaines	C. & N. W.	Under	18690	Oct. 19, 1928	Feb. 6, 1929	Feb. 20, 1929
61	112	McHenry	Crystal Lake	C. & N. W.	Over	17936	Jan. 3, 1928	Feb. 6, 1929	Mar. 6, 1929
63	631	Cook	Barrington	E., J. & E.	Over	18443	June 29, 1928	July 24, 1928	Oct. 22, 1929
64	130V-2	DuPage	Ingalton	C. & N. W.; E. J. & E.	Over	18461	Sept. 26, 1928	July 19, 1928	Oct. 15, 1929
86	106	Whiteside	Galt	C. & N. W.	Over	18638	Sept. 26, 1928	Feb. 6, 1929	Jan. 3, 1929
88	122	Bureau	Buda	C., B. & Q.	Over	19192	Apr. 30, 1929	July 18, 1929	July 24, 1929
88	123	Stark	Bradford	C., B. & Q.	Over	19334	June 27, 1929	July 18, 1929	July 24, 1929
95	118	Hancock	LaHarpe	T., P. & W.	Under	18673	Oct. 6, 1928	Feb. 7, 1929	Mar. 6, 1929
99	102	Hancock	Augusta	C., B. & Q.	Under	18703	Oct. 29, 1928	Feb. 7, 1929	Mar. 6, 1929
112	103	Madison	Gard Siding	C., C., C. & St. L.	Under	18636	Sept. 20, 1928	Oct. 10, 1928	Jan. 17, 1929
142	101	Effingham	Watson	I. C.	Under	19177	Apr. 25, 1929	June 4, 1929	June 19, 1929
157	118	St. Clair	Caseyville	Pennsylvania	Over	18447	June 30, 1928	July 19, 1929	Nov. 13, 1929
160	133	Madison	Bethalto	C., C., C. & St. L.	Over	18601	Sept. 12, 1928	Oct. 18, 1928	Jan. 10, 1929
160	134	Madison	Carpenter	C., C., C. & St. L.	Over	18600	Sept. 12, 1929	Oct. 18, 1928	Jan. 10, 1929
169	114	Shelby	Findlay	C. & E. I.	Under	19439	Aug. 15, 1929	Nov. 5, 1929	Dec. 3, 1929

TABLE 8—FEDERAL AID ALLOTMENTS.

Fiscal year ending June 30.	Fund.	Amount allotted to Illinois.	Sub-total.
1917	$ 75,000,000.00	$ 220,926.23	
1918		441,852.46	
1919		658,323.48	
1920		874,220.26	
1921		1,091,266.98	$ 3,286,589.41
1919	200,000,000.00	2,185,550.65	
1920		3,278,325.98	
1921		3,273,800.93	8,737,677.56
1922	75,000,000.00	$3,246,281.07	3,246,281.07
1923	50,000,000.00	$2,164,187.38	
1923	Reapportionment	28,611.00	
1924	65,000,000.00	2,797,888.59	
1925	75,000,000.00	3,203,867.99	
1926	75,000,000.00	3,191,479.00	
1927	75,000,000.00	3,175,616.00	
1928	75,000,000.00	3,154,429.00	
1929	75,000,000.00	3,135,225.00	
1930	73,125,000.00	3,118,949.00	
1931	73,125,000.00	3,100,781.00	27,071,033.96
Total Federal aid allotments to Illinois			$42,341,582.00

8. REFUNDS TO COUNTIES AND MUNICIPALITIES.—Under the $60,000,000 and $100,000,000 Bond Issue Acts provisions were made for the refund to counties for the cost of certain road work performed by them which was utilized and incorporated as a part of the Bond Issue System. The General Assembly subsequently enacted legislation providing for refunds to municipalities for certain city pavements constructed by them to connect bond issue roads built to the corporate limits. Following is an explanation of the status of these refunds.

(a) *Refunds to Counties.*—According to the provisions of the Bond Issue Acts, refunds may be made to counties for roads utilized and made a part of the State-wide system upon condition that such roads were constructed partly or wholly by the county and accepted by the State; and that the amounts of money so refunded be expended either for the purpose of retiring outstanding county bonds issued for the improvement of State Aid roads, or for the purpose of constructing durable hard-surfaced roads on the State Aid system under the direction and to the satisfaction of the Department of Public Works and Buildings. Table 10 shows the amount of money so refunded to the various counties and the mileage covered by such refunds to December 31, 1929.

The Department has adopted a policy of making a complete inventory on March 1 of each calendar year of all refunds that may be due and payable to the several counties for roads incorporated in the State Bond Issue system as outlined above. Only those counties which appear on this list are considered for allotment of refunds during the calendar year. The amount of money available for refund purposes is also calculated at that time, and if sufficient funds are found to be available to meet all of the refunds due, the amounts due each county

TABLE 9—STATUS OF FEDERAL AID DECEMBER 31, 1929.

Project number.	S. B. I. route number.	Length, miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total cost approved for Federal Aid.	Amount requested.	Amount received.
1-86		1,385.513							$44,422,617.85	$20,845,699.56	$20,827,945.94
87	3	4.348							141,382.98	65,220.00	65,220.00
88	18	3.477					$ 2,178.67	$ 1,089.34	82,012.83	41,006.41	41,006.41
89	3	11.165							305,278.70	148,619.55	148,619.55
90	3	7.649					4,144.95	2,072.48	214,208.33	107,104.16	107,104.16
91	31	3.303							128,626.37	49,545.00	49,545.00
92	3	14.363							399,249.31	199,624.65	199,624.65
93	3	19.735							557,527.32	276,473.55	276,473.55
94	22	5.076							154,946.34	77,473.17	77,473.17
95	23	19.735							525,628.44	262,814.21	262,814.21
96	13	23.805							670,991.60	328,046.69	328,046.69
97	9	30.212							844,569.98	422,284.98	422,284.98
98	16	12.859							340,999.36	170,499.67	170,499.67
99	9	19.082					18,348.11	11,130.04	527,253.13	254,644.91	251,829.40
100		Withdrawn							Withdrawn		
101		Federal Aid	paid county.						Paid to county		
102	24	12.833					14,436.38	6,272.68	411,896.30	191,749.58	191,749.58
103	1	18.804					117,549.74	58,774.87	361,143.88	180,571.93	180,571.93
104	34	38.570					77,249.02	36,372.46	1,158,117.73	540,337.22	540,337.22
105	8	18.381					46,888.90	22,464.59	503,293.38	199,427.33	199,427.33
106	39	21.222					15,734.58	7,867.30	581,008.26	290,504.12	290,504.12
107	30	17.979					36,193.37	17,664.74	511,038.22	253,907.30	253,907.30
108	36	18.030							435,269.81	217,634.90	217,634.90
109	40	39.133							1,128,666.77	561,581.08	538,028.75
110	13	8.830					14,131.92	6,963.58	340,797.83	149,446.11	149,446.42
111	36	11.538							292,516.15	146,258.07	146,258.07
112	31	23.102					61,727.79	30,126.63	609,703.81	292,197.47	292,197.47
113	16	7.477							176,199.18	88,099.59	88,099.59
114	38	8.907					11,444.04	4,570.54	303,848.98	136,032.63	136,032.63
115	13	13.637					47,376.63	23,600.58	431,518.70	207,825.88	207,825.88
116	78	11.165							442,144.99	176,221.39	176,221.39
117	59	4.497							147,562.80	67,455.00	67,455.00
118	154	7.896					30,476.60	14,270.51	298,741.89	138,914.98	138,914.88
119		Withdrawn								Withdrawn	
120	91	10.194					50,525.66	9,587.43	380,285.88	156,128.12	156,128.12
121	86	11.775					24,816.81	12,408.40	350,621.60	175,310.80	164,703.37
122	78	5.235							161,824.57	80,912.27	80,912.27
123	172	5.211					8,519.74	5,378.62	203,710.96	81,021.38	81,021.38
124	122	8.562					12,062.98	6,031.47	240,537.07	120,268.53	120,268.53
125	140	20.746	$468,000.00	$234,000.00					152,954.71	75,539.24	74,854.44
126	88	12.899					9,236.52	4,618.26	415,996.37	206,132.93	202,046.03

TABLE 9—Concluded.

Project number.	S. B. I. route number.	Length, miles.	Project statement.		Project agreement estimate.		Project agreement.		Completed work.		
			Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total estimated cost.	Amount requested.	Total cost approved for Federal Aid.	Amount requested.	Amount received.
127	151	8.281					$ 11,806.13	$ 5,107.39	$ 266,091.07	$123,496.41	$123,496.41
128	96	7.548					12,470.01	6,154.57	321,770.80	139,794.99	139,794.99
129	80	21.947					48,840.56	28,517.03	784,290.83	318,487.84	192,491.26
130	74	14.761			$99,968.66	$35,655.95	41,851.88	18,788.06	571,402.36	218,081.57	215,533.31
131	121	6.886					31,659.74	15,830.12	99,696.80	49,848.15	49,848.15
132	63	7.776					25,453.80	10,967.02	278,086.80	105,672.98	78,073.61
133	125	8.342					9,128.08	3,848.84	235,213.54	113,624.06	113,624.06
134	99	5.560							163,892.18	81,946.09	81,946.09
135	121	51.958	$666,000.00	$333,000.00			18,352.13	9,047.54	931,548.11	450,565.66	445,191.12
136	89	24.642	105,000.00	52,500.00			37,864.68	18,486.68	638,585.70	318,350.01	311,263.91
137	98	21.750					12,525.91	4,112.96	628,155.65	303,152.93	280,168.25
138	150	17.200	276,000.00	138,000.00			75,301.27	37,675.93	181,914.97	90,701.07	84,837.04
139	49	24.748					96,024.65	32,103.67	1,318,390.85	373,554.66	243,584.23
140	51	24.749					114,269.91	40,013.02	989,754.87	391,856.57	364,841.63
141	50	12.310					77,492.20	24,514.44	428,973.15	163,917.25	163,917.25
142	70	42.798					7,909.46	3,954.73	1,238,147.52	617,526.01	610,085.03
143	83	35.863	730,000.00	365,000.00			9,480.29	4,740.14	410,659.36	205,083.96	194,139.24
144	85	1.732					4,966.18	2,670.98	70,141.29	29,112.43	29,112.43
145	95	10.140					27,613.92	13,806.96	280,664.00	140,332.00	140,332.00
146	152	Withdrawn								Withdrawn	
147	157	17.981	520,000.00	260,000.00			345.75	219.22	173,945.08	69,435.60	52,677.30
148	152	17.921					9,669.30	4,781.63	529,886.74	260,718.09	260,718.09
149	162	12.249					16,510.50	8,255.25	305,794.97	152,897.48	152,897.48
150	88	31.139	25,000.00	12,500.00			68,273.78	36,051.25	902,724.98	445,875.48	441,966.68
151	58	27.397	120,000.00	60,000.00			109,258.68	42,680.35	1,113,116.59	412,208.68	292,497.95
152	160	27.852	600,000.00	300,000.00			36,925.92	18,462.96	284,774.51	142,387.24	142,387.24
153	122	29.897	500,000.00	250,000.00					373,751.68	186,875.84	186,875.84
154	147	11.311	189,859.10	94,929.55			6,861.70	3,936.39	186,809.64	91,025.61	91,025.61
155	80	27.393	530,000.00	265,000.00			75,395.17	28,636.56	343,587.99	164,817.01	161,696.39
156	164	27.084					175,276.43	83,278.16	835,499.45	380,315.22	380,315.22
157	47	8.328							221,659.08	110,411.60	106,442.87
158	47	25.421	775,000.00	387,500.00					68,549.46	34,274.72	32,917.66
159	48	8.688			63,487.22	31,743.61	12,375.08	6,187.54	191,419.31	95,709.65	66,316.33
160	48	13.325					27,899.45	13,949.73	316,441.61	158,220.80	155,115.82
161	146	Withdrawn								Withdrawn	
162	103	Withdrawn								Withdrawn	
163	121	Withdrawn								Withdrawn	
164	78	18.514	265,000.00	182,500.00			89,918.59	44,168.95	126,420.77	63,210.38	63,210.38
165	48	21.000									
166	126	25.592					719,073.09	359,536.53			
		2,617.028	$5,769,859.10	$2,934,929.55	$163,455.88	$67,399.56	$2,613,836.65	$1,211,749.12	$75,166,454.09	$34,986,022.71	$34,372,374.95

TABLE 10—REFUND TO COUNTIES.

County.	Miles of pavement.	Refund.*	County.	Miles of pavement.	Refund.*
Bond	3.407	$ 119,276.45	Macoupin	5.709	$ 179,902.24
Boone	.498	3,762.32	Madison	18.657	603,640.06
Bureau	1.933	12,854.54	Mason	1.433	54,066.22
Carroll	1.152	9,696.94	McHenry	1.795	10,161.59
Cass	.739	3,450.54	McLean	2.652	47,276.88
Champaign	10.023	81,899.26	Menard	1.122	51,242.44
Clark	6.102	126,258.68	Monroe	1.350	7,035.03
Coles	4.477	34,369.89	Morgan	1.149	7,966.07
Cook	58.903	1,459,373.64	Ogle	4.281	77,365.25
Cumberland	2.976	92,312.41	Peoria	22.583	371,456.25
DeKalb	7.754	78.341.46	Piatt	1.591	11,235.62
Douglas	6.847	103,953.62	Pike	1.605	8,066.39
DuPage	6.541	122,906.47	Putnam	.665	19,000.00
Edgar	2.013	14,148.08	Rock Island	.531	2,746.47
Edwards	.237	1,498.69	Sangamon	21.431	597,463.68
Effingham	7.219	107,567.51	Schuyler	1.566	10,904.79
Fayette	6.224	147,258.26	Shelby	1.603	17,554.03
Fulton	5.491	101,459.93	St. Clair	30.915	1,422,917.76
Grundy	3.747	120,001.45	Stephenson	1.136	12,838.53
Iroquois	4.077	110,578.51	Tazewell	6.816	145,468.60
Jersey	.587	1,836.64	Vermilion	55.675	611,172.20
Kane	39.996	966,168.11	Warren	4.716	41,470.74
Kankakee	15.679	262,481.27	Whiteside	4.521	78,354.29
Lake	22.920	608,088.92	Will	13.488	392.068.63
LaSalle	3.031	21,529.05	Williamson	8.181	98,770.57
Lee	6.030	100.713.67	Winnebago	7.480	175,386.67
Livingston	4.497	100,768.25			
			Total	455.751	$9,968,079.56

* Refund for pavement, grading and bridges included in total.

are set aside as allotments to the counties for use during the calendar year. If, however, it is found that the funds available are insufficient to cover all refunds due, the amount that is available is prorated to the several counties in proportion to the total amount due them.

(b) *Refunds to Municipalities.*—Prior to the enactment of legislation providing for the construction of $60,000,000 State Bond Issue routes within cities or villages of more than 2,500 population, a number of such municipalities had, at their own expense, constructed pavements to connect with such routes which were built to their corporate limits. The Fifty-fourth General Assembly enacted legislation, with an appropriation, to permit the refund of the cost of these pavements to such cities under the following conditions: that the population was less than 7,500, or if the population exceeded 7,500, that the residences along such pavement were located an average distance of more than 200 feet apart; that the pavement was constructed subsequent to January 1, 1921, and subsequent to the time work was started on the $60,000,000 Bond Issue road adjacent to the corporate limits; that the pavement followed the most feasible route through the city; and that the pavement was considered satisfactory by the Department from the standpoints of type, width, thickness, strength and smoothness. The Fifty-fifth General Assembly enacted similar legislation, with an additional appropriation for such refunds. During 1929 refunds amounting to $125,838.04 covering 5.178 miles of pavement were paid to 10 cities. These refunds were all paid prior to July 1, as the appropriation for this purpose lapsed on that date. The Fifty-sixth General Assembly made no appropriation for this purpose. Therefore, no further refunds to municipalities can be made unless additional legislation is enacted by the future General Assemblies. Table 11 shows the refunds which have been made to municipalities under the above described legislation from the time of its enactment to December 31, 1929.

TABLE 11—REFUNDS TO CITIES.

Route.	City.	Miles.	Amount.
37	Benton	.9705	$31,213.95
4	Bloomington	.2426	6,612.48
2	Carbondale	.2074	5,896.08
13	Carbondale	.6434	15,578.87
4	Carlinville	.1693	5,734.70
10	Champaign	.4958	11,710.61
16	Charleston	.4218	11,532.06
11	Effingham	.3220	9,944.24
25	Effingham	.1025	2,464.63
6	Geneva	.0956	2,715.90
22	Geneva	.3447	4,993.66
11	Greenville	.8099	25,936.36
43	Havana	.6880	20,217.84
10	Jacksonville	.1894	4,837.39
37	Johnston City	.7559	21.915.36
28	Kewanee	1.6954	47,495.25
3	Macomb	.0532	1,367.84
18	Naperville	.5834	9.356.20
4	Normal	.5362	14,000.38
2	Oglesby	.3686	12,116.96
2	Pana	.7512	22,213.74
24	Pana	.4705	10,835.59
6	Rochelle	.8805	24,970.41
27	Savanna	.0805	2,230.50
13	Sparta	.8373	23,206.48
22	St. Charles	.7890	23,264.10
25	Urbana	.2201	5,470.56
2	Vandalia	.7530	23,654.05
11	Vandalia	.0672	2,024.85
42	Waukegan	.4652	8,947.07
42	Zion	.4992	14.039.18
	Total	15.5093	$426.497.29

9. STATE AID SYSTEM.—Under the provisions of the law enacted in 1913, each county in the State was permitted to select a system of highways to be known as its State Aid System. This law provided that as nearly as possible, the routes selected for the State Aid system should consist of roads connecting the principal cities and trading points of the county with each other and with the principal cities and trading points of other counties. According to law each county is responsible for the upkeep of such portions of its State Aid system as have not been permanently improved and taken over by the Department of Public Works and Buildings. The roads comprising the State Aid System of each county were originally selected by the County Board of Supervisors or Commissioners with the approval of the Department of Public Works and Buildings. The law governing this matter specifies that counties of the first class may designate a maximum of 20 per cent of their total road mileage as State Aid roads, counties of the second class a maximum of 25 per cent, and counties of the third class a maximum of 50 per cent. To effect any change in the State Aid system, it is

necessary that the county board of supervisors of the county desiring such a change pass a resolution outlining the change contemplated and submit it to the Department for its consideration. Upon investigation if the Department considers the change desirable, the resolution is approved and the records of both the Department and the county are corrected accordingly. Many requests for such changes are made every year, each resolution being carefully investigated by this Section of the Bureau of Design and the request being decided by the Department strictly on its merits. Table 12 shows the total road mileage, and the permissible and designated State Aid mileage of each county as of December 31, 1929.

TABLE 12—STATUS OF STATE AID MILEAGE.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
Adams	2	1,538.00	384.50	380.00	4.50
Alexander	1	427.00	85.40	60.55	24.85
Bond	1	655.00	131.00	123.50	7.50
Boone	1	492.00	98.40	88.45	9.95
Brown	1	513.00	102.60	94.00	8.60
Bureau	2	1,481.00	370.25	331.60	38.65
Calhoun	1	317.80	63.56	59.80	3.76
Carroll	1	748.00	149.60	139.35	10.25
Cass	1	570.00	114.00	115.50	----------------
Champaign	2	1,910.00	477.50	390.13	87.37
Christian	2	1,269.00	317.25	260.30	56.95
Clark	1	994.00	198.80	179.95	18.85
Clay	1	842.00	168.40	165.30	3.10
Clinton	1	704.00	140.80	108.35	32.45
Coles	2	968.00	242.00	202.75	39.25
Cook	3	1,614.00	807.00	787.22	19.78
Crawford	1	821.00	164.20	137.20	27.00
Cumberland	1	687.00	137.40	117.25	20.15
DeKalb	2	1,089.00	272.25	223.48	48.77
DeWitt	1	732.00	146.40	113.25	33.15
Douglas	1	790.00	158.00	109.60	48.40
DuPage	2	776.00	194.00	191.10	2.90
Edgar	2	1,105.00	276.25	226.83	49.42
Edwards	1	414.00	82.80	67.60	15.20
Effingham	1	956.00	191.20	155.30	35.90
Fayette	2	1,240.00	310.00	231.55	78.45
Ford	1	848.00	169.60	99.35	70.25
Franklin	1	648.00	129.60	121.95	7.65
Fulton	2	1,488.00	372.00	358.50	13.50
Gallatin	1	440.00	88.00	77.80	10.20
Greene	1	805.00	161.00	159.35	1.65
Grundy	1	756.75	151.35	136.70	14.65
Hamilton	1	817.00	163.40	142.50	20.90
Hancock	2	1,452.00	363.00	239.80	123.20
Hardin	1	245.00	49.00	40.55	8.45
Henderson	1	595.00	119.00	101.40	17.60
Henry	2	1,401.00	350.25	285.55	64.70
Iroquois	2	2,108.00	527.00	487.30	39.70
Jackson	2	977.00	244.25	205.50	38.75
Jasper	1	960.00	192.00	156.20	35.80
Jefferson	2	1,100.00	275.00	245.45	29.55
Jersey	1	572.00	114.40	102.65	11.75
JoDaviess	2	883.00	220.75	163.90	56.85
Johnson	1	432.00	86.40	75.75	10.65
Kane	2	836.00	209.00	208.95	.05
Kankakee	2	1,300.00	325.00	254.22	70.78
Kendall	1	508.00	101.60	94.60	7.00
Knox	2	1,308.85	327.21	326.72	.49
Lake	2	850.70	212.68	199.69	12.99
LaSalle	2	2,006.00	501.50	382.03	119.47
Lawrence	1	662.00	132.40	128.85	3.55
Lee	2	1,229.00	307.25	293.13	14.12
Livingston	2	2,029.00	507.25	363.25	144.00
Logan	2	957.00	239.25	192.35	46.90
McDonough	2	1,094.00	273.50	263.80	9.70

TABLE 12—Concluded.

County.	Class.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
McHenry	2	993.00	248.25	242.25	6.00
McLean	2	2,080.00	520.00	325.80	194.20
Macon	2	1,027.00	256.75	213.65	43.10
Macoupin	2	1,427.00	356.75	298.17	58.58
Madison	2	1,169.00	292.25	249.35	42.90
Marion	2	1.138.00	284.50	249.80	34.70
Marshall	1	618.00	123.60	123.02	.58
Mason	1	798.00	159.60	152.85	6.75
Massac	1	368.00	73.60	53.75	19.85
Menard	1	506.00	101.20	97.20	4.00
Mercer	1	911.00	182.20	163.30	18.90
Monroe	1	527.00	105.40	104.10	1.30
Montgomery	2	1,258.00	314.50	252.10	62.40
Morgan	2	954.00	238.50	195.75	42.75
Moultrie	1	618.00	123.60	120.85	2.75
Ogle	2	1,330.00	332.50	332.20	.30
Peoria	2	1.099.75	274.93	197.20	77.73
Perry	1	706.00	141.20	116.55	24.65
Piatt	1	764.00	152.80	146.40	6.40
Pike	2	1,542.00	385.50	285.75	99.75
Pope	1	559.30	111.86	106.05	5.81
Pulaski	1	334.50	66.90	55.15	11.75
Putnam	1	270.00	54.00	45.45	8.55
Randolph	2	886.00	221.50	184.25	37.25
Richland	1	809.00	161.80	147.70	14.10
Rock Island	2	688.00	172.00	158.70	13.30
St. Clair	2	1,279.00	319.75	288.45	31.30
Saline	1	609.00	121.80	91.00	30.80
Sangamon	2	1,401.00	350.25	254.75	95.50
Schuyler	1	840.00	168.00	156.00	12.00
Scott	1	363.00	72.60	62.75	9.85
Shelby	2	1,495.00	373.75	279.60	94.15
Stark	1	531.00	106.20	112.05	----------
Stephenson	2	1,077.00	269.25	244.80	24.45
Tazewell	2	1,010.00	252.50	198.00	54.50
Union	1	626.00	125.20	120.80	4.40
Vermilion	2	1,558.00	389.50	333.80	55.70
Wabash	1	380.00	76.00	70.50	5.50
Warren	1	990.00	198.00	135.70	62.30
Washington	1	879.00	175.80	128.70	47.10
Wayne	1	1,381.00	276.20	245.20	31.00
White	2	992.00	248.00	181.91	66.09
Whiteside	2	1.130.00	282.50	247.50	35.00
Will	2	1,611.00	402.75	378.35	24.40
Williamson	2	827.00	206.75	163.65	43.10
Winnebago	2	1,025.53	256.38	252.05	4.33
Woodford	1	941.00	188.20	157.70	30.50
Total	--------	97,287.18	23,011.27	19,688.30	3,330.32

SUMMARY OF ROAD MILEAGE IN COUNTIES BY CLASSES OF COUNTIES.

County.	Number of counties.	Total road mileage.	Permissible State aid mileage.	Designated State aid mileage.	Permissible mileage not designated.
1	52	34,280.35	6,856.07	5,985.37	878.05
2	49	61,392.83	15,348.20	12,915.71	2,432.49
3	1	1,614.00	807.00	787.22	19.78
Total	102	97,287.18	23,011.27	19,688.30	3,330.32

10. TRAFFIC MAPS.—It is the policy of the Department to publish a traffic map from time to time for free distribution to the traveling public. These maps are prepared by the Road Section of the Bureau of Design and are issued usually a short time after January 1 and July 1, the information shown on the maps being compiled as of

those dates. The map consists of the outline of the State and various counties in black with the routes shown in red. Completed State Bond Issue and Federal Aid roads, construction work under way, approximate locations of routes not under contract, State Bond Issue and U. S. route numbers, and the more important and terminal points on the U. S. routes which traverse the State are among the essential information shown on the face of the map. On the reverse side are shown official State highway markings; a small scale map of the State showing the location of U. S. marked routes; a list showing the location of State parks, monuments and points of interest; a tabulation showing construction progress by years, amount of pavement available for traffic, work under contract, and world's highway construction records held by Illinois; and a distance schedule on which are listed some 140 cities and towns, chosen for their strategic location on the highway system, and from which the distance between any two of the cities and towns listed may be readily obtained.

B. Bridge Section.

1. DUTIES.—The work of the Bridge Section includes the following functions:

a. The preparation of plans for bridges and other drainage structures on State highways.

b. The preparation of plans for overhead grade separations on State highways.

c. The preparation of plans for county and township bridges. This service is free upon request from County Superintendents of Highways, and includes the preparation of proposal blanks and the advertising of lettings.

d. The checking and approval of plans prepared by County Superintendents of Highways, as required by law.

e. The checking and approval of detailed shop drawings for structural steel work. This applies to both State and County work.

f. The shop inspection of fabricated steel for steel bridges, both State and county.

g. The investigation and analysis of old bridges to determine strength and fitness for carrying highway traffic.

h. The preparation of specifications for the design and construction of highway bridges.

i. The rendering of assistance to County Superintendents of Highways and other highway officials on all questions relating to bridge design and construction.

2. WORK ACCOMPLISHED IN 1929.—The work performed in 1929 is classified as follows:

a. Plans Prepared:

	Number.	Estimated Cost.
County and township	243	$ 830,033.85
State bridge contracts	79	1,995,830.65
Culverts—State road contracts	1,698	541,028.73
Totals	2,020	$3,366,893.23

b. Contracts Awarded:

	Number.	Contract Price.
County and township	157	$ 518,427.91
State bridge contracts	52	1,032,873.22
Culverts—State road contracts (included in road costs)	....	....
Totals	209	$1,551,301.13

c. Shop drawings for steel bridges approved	39
d. Shop inspections of steel bridges	40
e. Plans approved for County Superintendents of Highways	1,258
f. Old bridges analyzed for strength	5

The largest projects for which plans were completed during the year were:

The Galena River Bridge at Galena on Route 5. Type, reinforced concrete deck girders; spans, one at 45 feet 7 inches; one at 35 feet; seven at 55 feet 5 inches; roadway 24 feet, with one 6 foot sidewalk. This structure includes a grade saparation with the C. B. & Q. railroad.

The DesPlaines River Bridge on Route 18 at Ogden Avenue. Type, reinforced concrete deck girders, designed to carry both highway and street railway traffic. Spans, six at 55 feet; roadway 44 feet, with two 5 foot sidewalks.

The bridge across the Wabash River at Mt. Carmel, consisting of 12 steel spans of 225 feet each, with a clear roadway width between hub guards of 22 feet. This is proposed for construction in 1930 at the joint expense of the States of Illinois and Indiana.

The largest projects placed under contract during the year were:

The bridge over the Kaskaskia River near Carlyle, authorized by special appropriation by the Fifty-fifth General Assembly. The channel span of this bridge is a steel truss of 180 feet, supported upon concrete piers. Overflow area for high water is provided by steel beam spans with concrete floor and hand rails, supported upon reinforced concrete pile bents. These spans are, one at 46 feet 10 inches, and nineteen at 47 feet 7 inches. The roadway width is 22 feet. Total contract price, including cement and paint furnished by State, $85,793.58.

The Peoria Avenue Bridge across the Rock River at Dixon, built jointly by Lee County and the City of Dixon. Type, reinforced concrete deck girders, with a 40 foot roadway and two 6 foot sidewalks. Spans, nine at 65 feet each. Contract price $166,600.00.

3. OVERHEAD GRADE SEPARATIONS.—Believing that the separation of grades is vital to the safety of traffic as well as its most expeditious movement, the Department has continued to prosecute a program of grade separation as rapidly as available funds will permit. The Bridge Section of the Bureau of Design prepares plans for all overhead grade separations upon the State system of highways. Tables 13, 14 and 15 indicate the volume of work handled in 1929.

4. RECORD OF BRIDGE WORK—1906 TO 1929.—Table 16 permits a comparison of the amounts of bridge work handled each year from 1906 to 1929. It includes all bridges, both county and township, and State, designed to be built under separate bridge contracts, but it does not include culverts to be built in connection with paving and grading contracts. The amount of culvert work performed during the year 1929 is indicated in section 2 of this report. The amount of bridge work handled in 1929 was appreciably less than in the years immediately pre-

TABLE 13—PRELIMINARY GRADE SEPARATION PLANS PREPARED.

Route.	Section.	County.	Near.	Railroad.	Estimated cost.
1	7-V	Edwards	Albion	Southern	$ 15,003.63
1	KV-2	Cook	Riverdale	B. & O. C. T	193,002.60
5	19-V	Stephenson	Freeport	I. C	13,396.32
18	8-V	Cook	LaGrange	I. H. B	197,895.14
74	102-V	Stephenson	Freeport	I. C	21,823.76
88	122-VBC	Bureau	Buda	C., B. & Q	24,898.39
88	125-VBC	Peoria	Edelstein	A., T. & S. F	16,885.82
95	122-V	McDonough	New Philadelphia	C., B. & Q	13,910.76
121	104-V	Tazewell	East Peoria	T., P. & W. and L. E. & W	118,114.34
126	117-V	Montgomery	Litchfield	C., B. & Q	14,074.70

Totals—Number of projects, 10; estimated cost, $629,005.46.

TABLE 14—COMPLETE GRADE SEPARATION PLANS PREPARED.

Route.	Section.	County.	Near.	Railroad.	Estimated cost.
4	430-V	Cook	McCook	B. & O. C. T	$58,281.00
5	19-V	Stephenson	Freeport	I. C	12,955.46
10	37-V	Morgan	Jacksonville	C., B. & Q	21,185.82
49	143-V	Will	Monee	I. C	57,204.50
51	511-V	Cook	Spring Forest	Rt. 4 A. & Rt. 51	33,615.25
61	112-V	McHenry	Crystal Lake	C. & N. W	31,314.14
63	631-V	Cook	Barrington	E., J. & E	31,670.90
88	121-VBC	Bureau	North of Buda	C., R. I. & P	16,391.58
88	122-VBC	Bureau	Buda	C., B. & Q	24,924.68
88	125-VBC	Peoria	Edelstein	A., T. & S. F	21,095.30
95	122-V	McDonough	New Philadelphia	C., B. & Q	13,579.08

Totals—Number, 11; estimated cost, $322,217.71.

TABLE 15—GRADE SEPARATION CONTRACTS AWARDED.

Route.	Section.	County.	Near.	Railroad.	Contract cost.
7	8-VBC	Bureau	Sheffield	C., R. I. & P	$20,306.73
10	37-V	Morgan	Jacksonville	C., B. & Q	21,691.42
29	VB	Bureau	Bureau	C., R. I. & P	63,627.74
61	112-V	McHenry	Crystal Lake	C. & N. W	28,291.14
64	130-V2	DuPage	Ingalton	C. & N. W	57,199.01
86	105-V	Whiteside	Galt	C. & N. W	23,577.00
88	121-VBC	Bureau	Buda	C., R. I. & P	15,310.02
88	122-VBC	Bureau	Buda	C., B. & Q	22,695.63
160	133-VB	Madison	Bethalto	Big Four	15,445.12
160	134-VB	Madison	Carpenter	Big Four	14,644.87
160	135-VB	Madison	Carpenter	Wabash	13,323.45

Totals—Number, 11; estimated cost, $296,112.13.

TABLE 16—BRIDGE PLANS PREPARED AND CONTRACTS AWARDED FROM 1906 TO 1929.

Year.	Plans and specifications prepared.	Estimated cost.	Contracts let on State plans.	Contract price.	Foreign plans approved.
1906	15	------	11	$ 37,035.00	Plans prepared by county superintendent of highways and others outside of Division of Highways.
1907	113	------	48	41,519.00	
1908	149	------	64	165,674.00	
1909	122	------	92	133,285.00	
1910	203	------	141	148,432.00	
1911	241	------	127	238,903.00	
1912	214	------	150	212,694.00	
1913	238	$ 342,052.00	139	200,834.00	5
1914	269	470,363.00	109	184,792.00	269
1915	707	984,420.00	565	541,509.00	230
1916	735	1,169,743.00	439	566,657.00	653
1917	480	812,614.00	502	582,993.00	503
1918	206	499,702.00	169	277,130.00	443
1919	231	761,458.68	202	514,897.00	725
1920	443	2,841,896.22	301	2,208,494.84	261
1921	384	2,134,476.49	337	1,909,455.67	362
1922	374	2,365,726.45	317	1,775,066.00	839
1923	484	3,359,109.03	413	3,170,269.46	1,451
1924	420	4,220,819.17	258	1,594,035.90	886
1925	340	2,972,560.80	283	2,940,774.86	1,215
1926	281	3,782,267.84	164	2,702,055.34	1,145
1927	402	3,991,491.67	310	2,137,389.93	1,516
1928	590	7,691,006.93	563	6,537,807.43	1,749
1929	322	2,825,864.50	209	1,551,301.13	1,258
Total	7,963	$41,225,571.78	5,913	$30,373,004.56	13,510

ceding for several reasons: The major portion of the State program for 1929 was placed under contract before the close of 1928. A number of men in the Bridge Division were engaged throughout the year on plans for large structures which were not completed and therefore could not be included in the records of completed work. Because of pending court decisions affecting the State gasoline tax, it was impossible to prepare plans and award contracts for an extensive program in 1930.

5. DESCRIPTION OF PHOTOGRAPHS.—Illinois is called a prairie state, but a study of its topography indicates conditions quite otherwise. It contains all sorts of geologic formations, from the bluffs of the Mississippi and Illinois Rivers, through the rolling land and wide overflow bottoms of central Illinois, to the Ozark Mountains and cypress swamps of southern Illinois. To build bridges which will fit these variable conditions and result in economical construction, many types and designs of structures are required. A number of photographs have been selected to illustrate the different designs in most general use. These views are taken from each of the nine districts and give a rather comprehensive idea of the character of the bridges being built upon the public highways of Illinois.

Figure 10 is the bridge over the Calumet-Sag Channel on Route 51 in District No. 1. The channel span is 165 feet long with two approach spans of 30 feet each. The roadway width is 44 feet. This structure is designed to meet the requirements of navigation between the Illinois Deep Waterway and Lake Michigan. Total cost $61,390.94.

Figure 11 is a good illustration of an overhead grade separation structure. This is located at Oregon in District No. 2, and carries

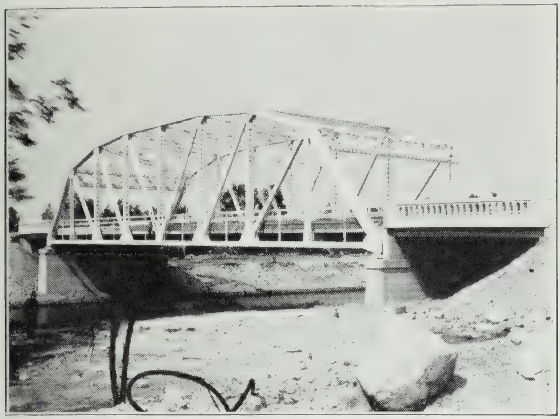


Figure 10.—Bridge on Route 51 over Calumet-Sag Channel.

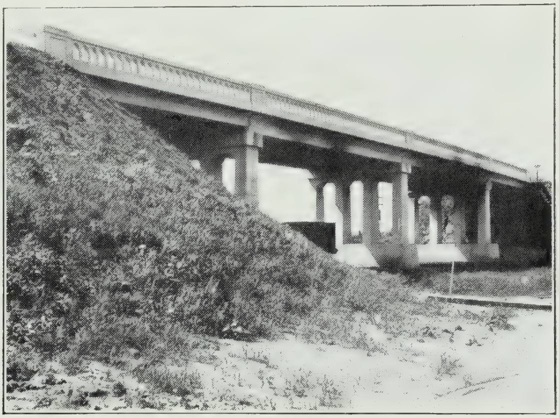


Figure 11.—C. B. & Q. Overhead at Oregon.

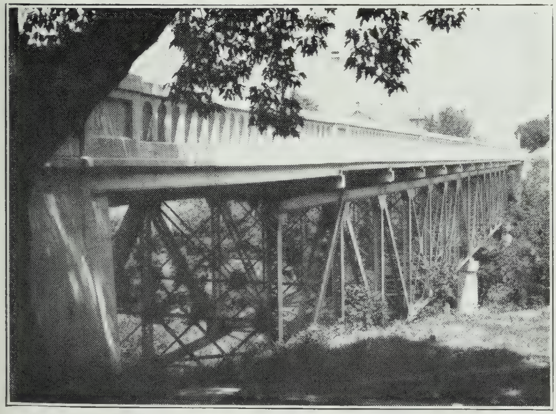


Figure 12.—Deck Truss Bridge at Mt. Carroll.

Route 2 over the C. B. & Q. railroad. The superstructure is of the reinforced concrete deck girder type, supported upon skeleton or open piers and abutments. Track spans, two at 51 feet each; approach spans, two at 35 feet each; roadway 24 feet. Contract price $19,945.18.

An unusual type for Illinois is the deck truss, shown in Figure 12. This is on Route 78 at Mt. Carroll, District No. 2, and crosses a deep ravine just north of the Court House. Spans, two at 129 feet and two at 32 feet. Roadway 24 feet with two 5-foot sidewalks. Contract price $59,158.11.

District No. 3 has the honor of possessing the first movable bridge to be completed by the Department across the Illinois River. This is at LaSalle on Route 2. Figure 13 is a close-up of the channel span in operation. Figure 14 is a general view of the new bridge with the old highway bridge in the foreground, and the Illinois Central railroad bridge in the background. The spans are seven at 200 feet each, and the vertical lift channel span of 260 feet. Roadway width 24 feet. When open, the channel span provides a vertical clearance of 65 feet above high water and a horizontal clearance of 250 feet between fender piers. This is designed to take care of the navigation which is anticipated upon the completion of the deep waterway from the Lakes to the Gulf. The channel span is operated, at present, with a 40 H.P. gasoline motor. The time required for operation, either raising or lowering the span, is four minutes. Provision has been made for installing electric motors when the volume of navigation becomes large enough to require frequent operation of the channel span. These will reduce the time of operation to one and one-half minutes under ordinary conditions. The bridge was completed, except for painting the towers, and thrown open to traffic in December 1929. The total cost, including the approaches and pavement, was $536,103.34.

Figure 15 is a construction view of the bridge across the Illinois River at Pekin, in District No. 4, taken December 31, 1929. It shows the channel span being floated into place upon barges. This operation was completed successfully and without any great difficulty. The bridge, when completed, will have three concrete deck girder spans of 43 feet each; two steel spans of 100 feet each; four steel spans of 180 feet each, and the vertical lift channel span of 260 feet. The roadway width is 24 feet, with a 5-foot sidewalk on the south side. The contract price, including approaches is $529,599.59. This project will be completed about June 1, 1930.

A typical example of bridge work in District No. 5 is shown in Figure 16. The structure in the foreground combines a stream crossing with a railroad grade separation. The type is reinforced concrete deck girders. Spans, one at 50 feet and two at 30 feet; roadway 22 feet. Contract price $11,501.81. The bridge in the background is over the south fork of the Vermilion River. The spans are steel trusses; one at 150 feet and two at 100 feet; roadway 22 feet. Contract price $42,262.70.

Construction work in harmony with the natural surroundings adds greatly to the appearance of a highway, and also to the pleasure of the

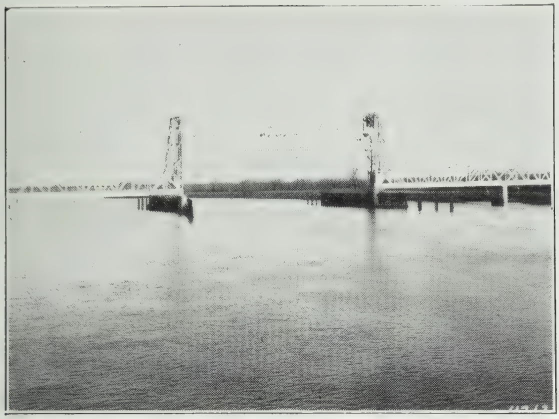


Figure 13.—Channel Span —Illinois River Bridge at LaSalle.

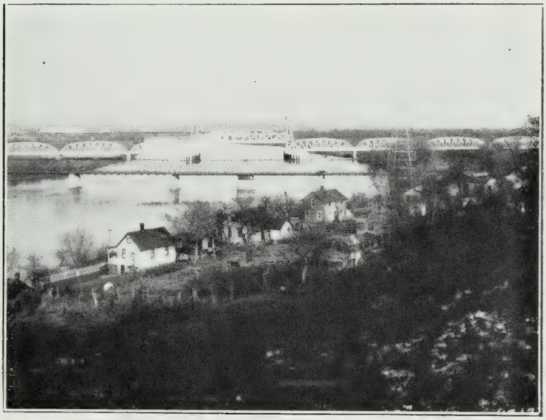


Figure 14.—Illinois River Bridge at LaSalle.

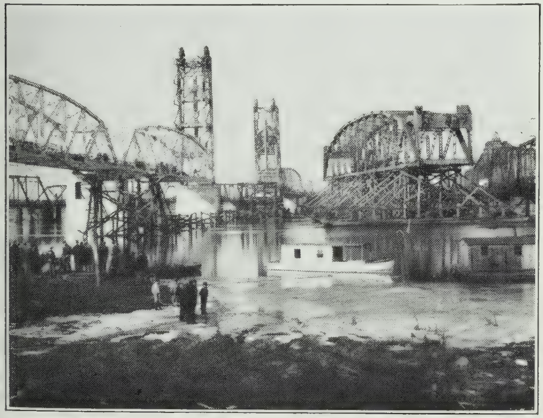


Figure 15.—Illinois River Bridge at Pekin.

traveling public. An example of the possibilities along this line is shown in Figure 17. This is in District No. 6, on Route 36, east of Pittsfield. The rough stone rails and wing walls are in perfect harmony with the rugged character of the topography.

Figure 18 is representative of the river crossings in District No. 7 where, in many cases, the high water flow spreads over a wide area. This particular bridge is over the Embarrass River on Route 12 east of Lawrenceville. The channel, which is of ordinary width, is spanned by a steel truss of 170 feet. Additional opening for high water overflow is provided by twenty-five reinforced concrete deck girder spans of 50 feet each. The roadway is 22 feet wide. Contract price $134,589.40.

Route 13 crosses the Kaskaskia River at New Athens in District No. 8. When the road was paved several years ago the old bridge was left in place. It was a wrought iron structure built in 1878, with a channel span of 218 feet and two approach spans of 29 feet each, with an 18-foot roadway. The metal was in a good state of preservation, but the load carrying capacity of the spans was not sufficient for heavy truck traffic, and the narrow roadway was a source of danger. Therefore, reconstruction was decided upon. The old stone masonry piers and abutments, in excellent condition after so many years of service, were retained and widened with concrete caps. The old iron spans were removed and replaced with new steel spans having a 22-foot roadway. The cost of the work was $38,425.58. The completed structure is shown in Figure 19.

Figures 20 and 21 present an excellent example of reinforced concrete arch construction. It is located in District No. 9, at Dixon Springs, on Route 146. Several studies were made of this location to determine upon the most economical method of construction. The alternates were to build a long structure on a high grade line, or a small structure with a low grade line involving heavy rock excavation through the adjacent hills. The lowest cost of construction was indicated by the structure shown. The central span is 180 feet flanked by a 50-foot span on each end. The roadway width is 22 feet. The contract cost was $42,343.18.

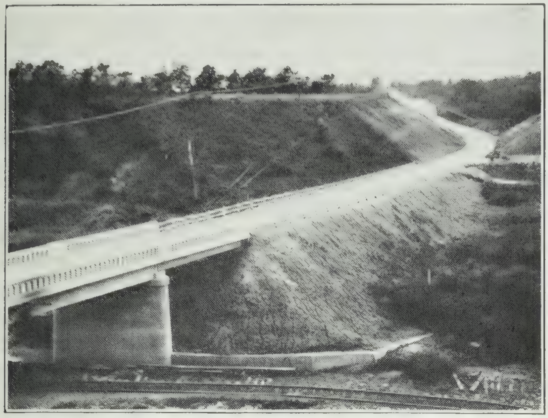


Figure 16.—Route 10 west of Danville.

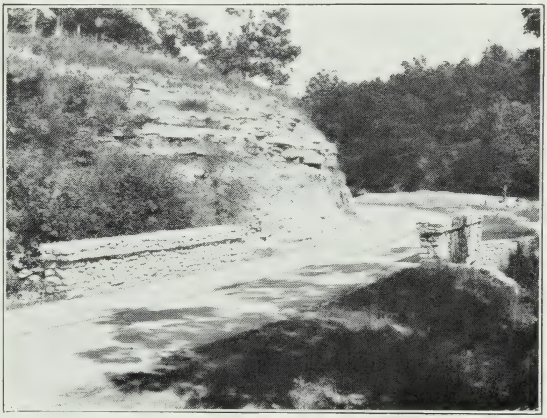


Figure 17.—Route 36 east of Pittsfield.

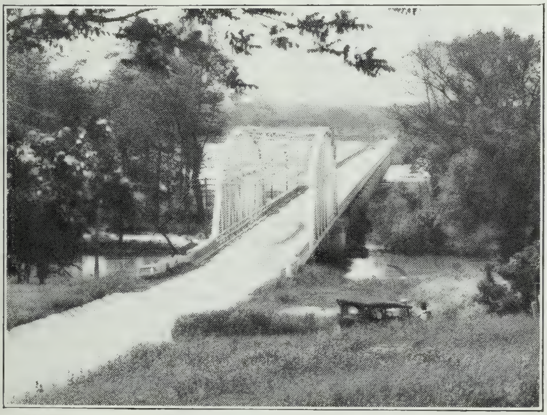


Figure 18.—Embarrass River Bridge east of Lawrenceville.

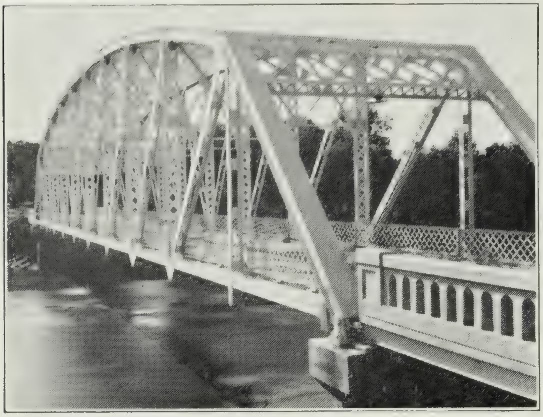
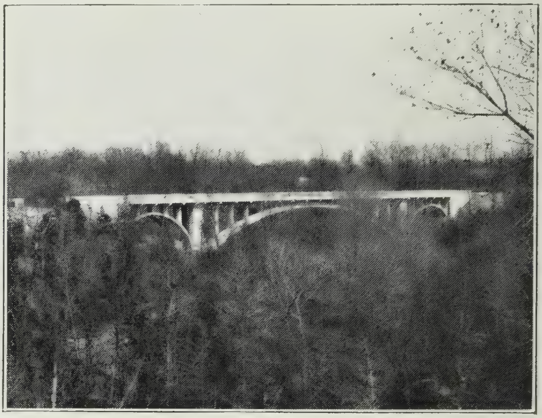


Figure 19.—Kaskaskia River Bridge at New Athens.

Figure 20.—Route 146 at Dixon Springs.



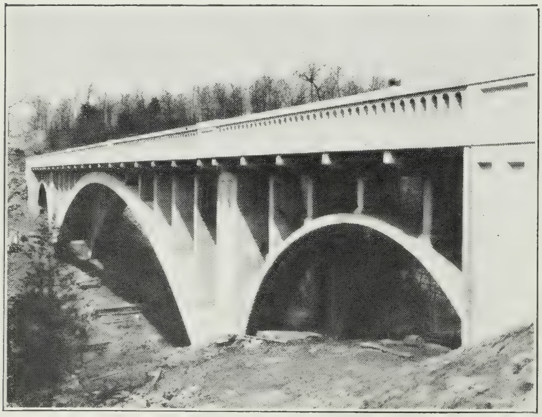


Figure 21.—An Open Spandrel Arch—Route 146.

III. BUREAU OF CONSTRUCTION.

1. DUTIES.—The Bureau of Construction has general supervision of:

a. All construction activities, carried on by the State, subsequent to the awarding of contracts. This work includes:

(1) The formulation of construction policies.
(2) Interpreting the terms of the contracts.
(3) Interpreting the specifications.
(4) The settlement of difficulties which may arise between the district organizations and the contractors.
(5) General inspection of the work.
(6) Checks on the progress of the work.
(7) The handling of payment estimates.
(8) Final inspection and acceptance of the work.
(9) Checking and passing final payment estimates.

b. Work constructed by the counties under Section 15-D of the State Aid Act.

c. The activities of the Day Labor or State-owned construction outfits.

d. The allocation of cement purchased by the State.

e. The checking of freight rates on construction materials used on contract work.

f. The handling of Federal Aid reimbursements.

g. The distribution of crushed stone produced at the Joliet and Menard State Penitentiaries.

h. The compilation of statistical data relative to the work constructed.

The Engineer of Construction and his assistant have general supervision of these activities, but the detailed work is handled by the district organizations under the direction of the District Engineer and his assistant, in charge of construction. The Engineer of Construction also acts for the Chief Highway Engineer in studying the ability of each contractor before a contract is let.

2. WORK ACCOMPLISHED DURING 1929.—The Bureau of Construction was extremely active during the calendar year 1929, even though the actual construction program carried out was reduced from that of several former years, due to the limited amount of money available. A total of 752.41 miles of pavement, 178.23 miles of heavy grading and 215 bridges were completed. Twenty-six grade separations were completed in 1929 and fifteen were placed under contract. Particular attention was also given during 1929, to the construction of retaining walls, slope walls, special gutter section outlets, etc., to prevent slides and washes. The four State-owned construction outfits completed a total of 38.24 miles of pavement on ordinary paving sections and gaps which had been left for grade separations and settlement of fills. Bids were called for on the quantity of cement needed for the

1929 construction program, contracts were let for this cement and a total of 2,316,955 barrels of cement were shipped for construction during the year. A total of 64,205½ cubic yards of crushed stone were shipped from the two State penitentiaries to various townships and for the use of this and other State departments and requisitions were handled for an additional 37,424½ cubic yards which could not be supplied. The four core drill outfits took a total of 9,441 cores on the various pavement sections and a total of 1,451 cores were taken in connection with the collection of the early strength data and the investigation of blow-ups, disintegrated spots and scaling. The Freight Rate Division, checked the freight rates on all of the construction materials used on the contract work, and cooperated with the Commerce Commission in the matter of freight increases. The Statistical Division compiled considerable data during the year which should be of material value of the Chief Highway Engineer and his assistants.

One outstanding feature of the 1929 program was the fact that practically all work was under contract prior to February 1, 1929. As a result, the work was started as soon as the weather conditions would permit in the spring and was more nearly completed by December 31 than in any previous year. This eliminated, to a great extent, the placing of concrete during the low temperature periods when the danger of disintegration due to freezing is greatest and when costs are high due to weather interruptions. Table 17 shows the construction work carried over from 1928, the 1929 program, the work carried over to 1930 and the number of contractors engaged in the carrying on of the various types of work. Detailed reports of the various activities of the Bureau follow:

TABLE 17—SUMMARY OF 1929 CONSTRUCTION.

Construction program.	Pavement miles.	Grading miles.	Bridges, number.
Carried over from 1928	525.40	149.57	156
Awarded during 1929	318.56	64.40	87
Net additions to existing contracts during 1929		4.36	14
Net deductions from existing contracts during 1929	20.55		
Total under contract for 1929	823.41	218.33	257
Constructed during 1929	752.41	178.23	215
Carried over to 1930	71.00	40.10	42

NOTE.—The above totals do not include 2.49 miles of pavement built with special appropriation in Districts 2 and 4.

PAVEMENT, GRADING AND BRIDGE CONTRACTORS HAVING STATE OR COUNTY WORK.

Pavement contractors, including county work under Section 15-d of the road and bridge laws	117
Grading contractors, including County 15-d work	58
Bridge contractors, including County 15-d work	91
Total	266

3. IMPROVED ROADS.—Over ninety (90) per cent of the total pavement under contract during 1929 was completed and although the mileage completed was less than that of several former years, an examination of Figure 22 shows that it was nearly equal to the average of the preceding nine years.

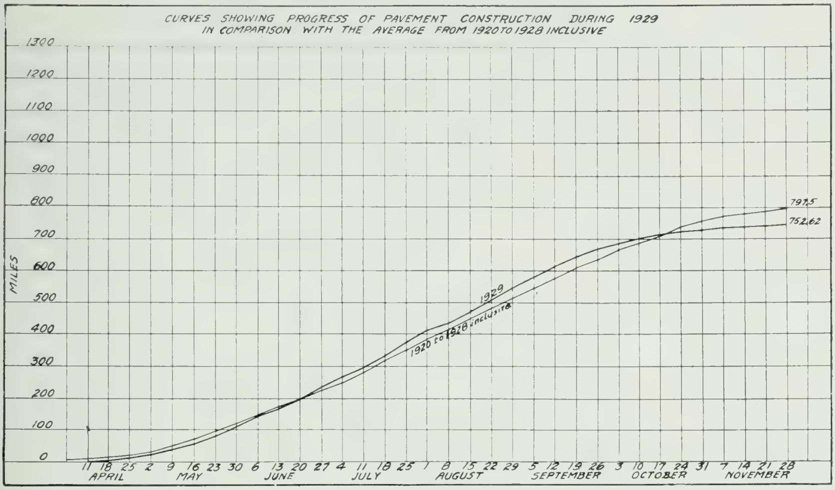


Figure 22.

Table 18 shows that of the 752.41 miles of improved roads constructed, 745.03 miles were of portland cement concrete, 5.55 miles of brick surface laid on concrete base and 1.83 miles of gravel. These data also show that 624.40 miles of the total mileage were constructed by the State on the State Bond Issue System, and 128.01 miles were constructed by the counties on the State Aid System under Section 15-D of the State Aid Act.

A special effort was made during 1929 to relieve traffic congestion in metropolitan areas by the construction of more and wider highways. Table 19 shows the improved roads built within a 50 mile radius of Chicago.

Figure 23 shows the average daily output of concrete pavement in square yards from 1921 to 1929, inclusive. This curve was explained in detail in the 1928 report, and the portion of the curve representing 1929 verifies the statement made in the 1928 report that the contractors, equipment producers, material producers, and road officials have now organized their work and perfected their equipment to the point where maximum outputs are possible.

Figure 24 shows the actual progress in pavement construction during 1929. The fluctuations in this curve generally indicate unsuitable weather conditions. The general trend of the curve shows that the contractors had their work well organized and under way by the middle of

TABLE 18—SUMMARY OF DIFFERENT TYPES OF IMPROVED ROADS CONSTRUCTED IN 1929—LENGTHS GIVEN IN MILES.

Type.	60 million.		100 million.		County 15d miles.	Total miles.
	Bond issue, miles.	Federal aid, miles.	Bond issue, miles.	Federal aid, miles.		
4′ concrete	.30		.98			1.28
8′ concrete	.44		2.95			3.39
9′ concrete	.03		18.42		14.83	33.28
10′ concrete					26.51	26.51
12′ concrete					.03	.03
18′ concrete	36.20	5.30	402.40	73.82	8.81	526.53
20′ concrete	2.75	.19	30.89	28.14	42.55	104.52
22′ concrete	.02		.17	.03	29.73	29.95
24′ concrete	.09				.14	.23
30′ concrete					.49	.49
40′ concrete	.86		13.82	1.05	3.09	18.82
18′ brick			5.55			5.55
14′ gravel					1.83	1.83
Total	40.69	5.49	475.18	103.04	128.01	752.41

Note.—The above totals do not include 2.49 miles of pavement built with special appropriation in Districts 2 and 4.

TABLE 19—STATE BOND ISSUE CONSTRUCTION IN THE CHICAGO METROPOLITAN AREA.

	Cook.	Kane.	DuPage.	Lake.	Will.	Total.
New 18 and 20 foot pavement	25.86	14.60	.92	25.03	5.80	72.21
New 40 foot pavement	13.82		.10			13.92
Replacement of old pavement with 18 or 20 foot pavement	1.63					1.63
Replacement of old pavement with 40 foot pavement	.76					.76
Total	42.07	14.60	1.02	25.03	5.80	88.52

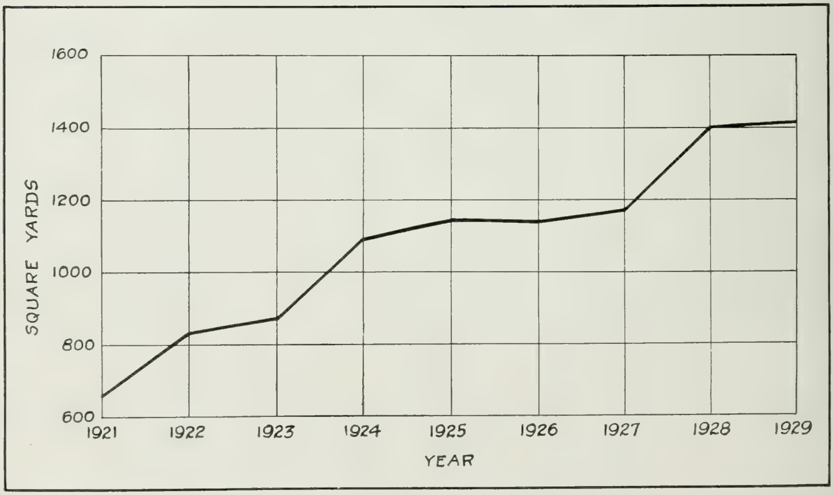


Figure 23.—Curve showing average daily output of concrete in square yards from 1921 to 1929, inclusive.

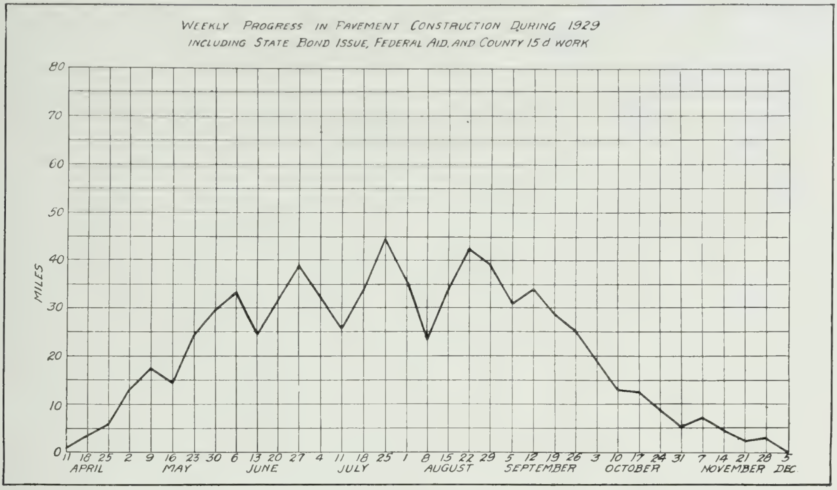


Figure 24.

May and that the majority of the work was completed by the first of October or before the fall rains and low temperature would tend to slow up the work and increase the cost.

For several years, it has been the practice to analyze the unit cost for a number of typical sections of work selected from various parts of the State, in order that a cost basis may be established for purposes of comparison. The analysis includes all expenditures made on these sections of work. If the heavy grading, and bridge work was done in advance of the pavement, all of this cost is included, as well as the cost of the cement which is furnished by the State. The analysis covers 1,495 miles of 18′ concrete pavement selected as follows from work performed during the period 1922 to 1929, inclusive:

1922	126 miles
1923	114 miles
1924	113 miles
1925	203 miles
1926	197 miles
1927	125 miles
1928	213 miles
1929	404 miles
	1,495 miles

The average cost per mile is $29,945.35. Figure 25 shows the cost distribution of each $1.00 expended on the 1,495 miles mentioned. The item marked "Miscellaneous" includes catch basins, section markers, gutters, and extra work not included under the headings shown on the diagram. Figure 26 shows the cost distribution of each $1.00 expended on 404 miles selected to represent Illinois in 1929. The average cost, including all items of cost, was $29,539.48 per mile. There is a close agreement between the unit cost shown on this diagram and those shown on the diagram in Figure 25 representing the average unit cost for the eight year period.

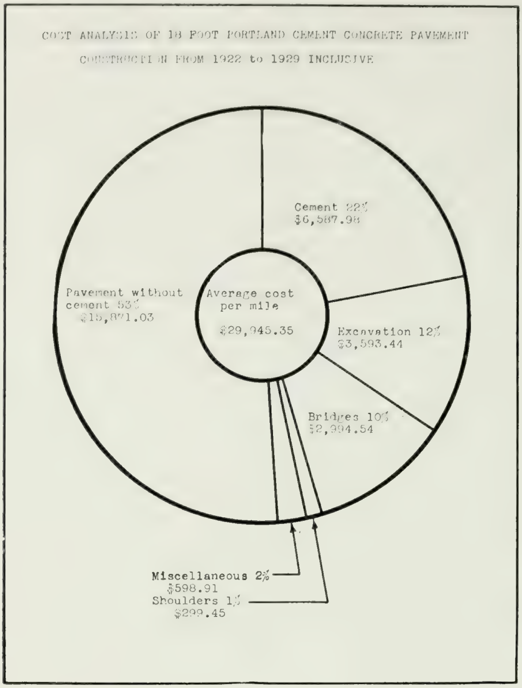


Figure 25.

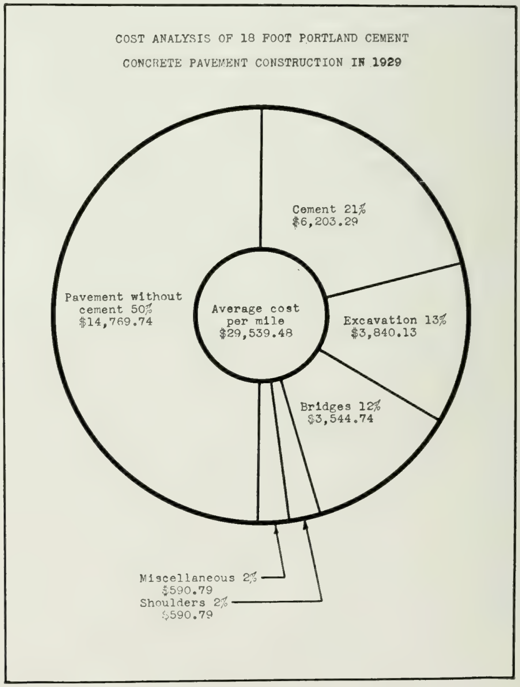


Figure 26.

Table 20 shows the mileage of pavement which was available to traffic in each county on January 1, 1930. This mileage is arranged according to the classification under which it is built; that is, State Bond Issue, Federal Aid, State Aid, or County 15-D. The mileage shown under the columns headed "State Bond Issue" and "Federal Aid" make up the State trunk line system. The Federal Aid System in Illinois is coincident with the State Bond Issue system. In general, the pavements as shown under the headings "State Aid" and "County 15-D" are not connected to form a unified system, except in three or four counties.

TABLE 20—TOTAL NET MILEAGE AVAILABLE TO TRAFFIC IN EACH COUNTY AS OF JANUARY 1, 1930.

County.	State bond issue.	Federal aid.	State aid.	County 15d.	Miscellaneous.	Total.
Adams	75.30	19.64	4.21	2.51	2.87	104.53
Alexander	13.65	0	9.58	19.62	0	42.85
Bond	16.61	20.86	1.48	7.54	0	46.49
Boone	29.55	0	3.70	0.34	0	33.59
Brown	10.27	7.62	0	0	0	17.89
Bureau	41.89	74.81	7.94	19.22	0	143.86
Calhoun	10.05	0	1.30	0	0	11.35
Carroll	36.55	42.02	3.53	5.97	0	88.07
Cass	17.16	14.36	3.93	0	0	35.45
Champaign	68.99	19.61	2.54	130.85	0	221.99
Christian	49.18	18.02	0	0	1.06	68.26
Clark	34.11	30.90	1.36	4.48	0	70.85
Clay	38.97	3.54	1.35	0	0	43.86
Clinton	33.47	11.88	1.38	0	0	46.73
Coles	41.44	11.76	0.44	0.89	0	54.53
Cook	93.09	65.90	21.77	560.30	1.34	742.40
Crawford	42.26	0	1.71	0	0	43.97
Cumberland	20.84	20.93	2.23	7.76	0	51.76
DeKalb	45.38	29.41	6.01	2.61	0	83.41
DeWitt	21.39	3.05	0	0	0	24.44
Douglas	24.65	15.71	1.76	21.93	0	64.05
DuPage	60.85	12.18	0.10	49.32	0	122.45
Edgar	36.79	21.76	3.67	2.03	0	64.25
Edwards	17.47	0	0.88	0.54	0	18.89
Effingham	38.23	24.44	0.70	0.38	0	63.75
Fayette	33.47	25.15	1.93	0	0	60.55
Ford	52.85	28.90	0.83	0	0	82.58
Franklin	65.05	6.49	3.14	4.18	0	78.86
Fulton	65.13	47.67	2.82	5.57	0.39	121.58
Gallatin	21.65	0	0	0	0	21.65
Greene	42.11	5.63	0	0	0	47.74
Grundy	29.71	26.46	3.91	5.07	0	65.15
Hamilton	18.69	0	0	0	0	18.69
Hancock	62.61	24.02	0	0	0	86.63
Hardin	0	13.99	0	0	0	13.99
Henderson	40.18	0	0.51	0	0	40.69
Henry	94.82	6.26	2.11	0	0	103.19
Iroquois	113.19	57.68	9.21	142.83	0	322.91
Jackson	41.20	3.55	1.50	0	0.25	46.50
Jasper	45.40	0	0	0	0	45.40
Jefferson	24.48	12.31	0.72	0	0	37.51
Jersey	24.50	7.16	0	0.15	0	31.81
JoDaviess	45.14	28.51	0.26	0	0	73.91
Johnson	17.24	5.48	0	0	0	22.72
Kane	36.95	23.70	9.16	63.50	0	133.31
Kankakee	81.36	64.46	4.14	22.08	0	172.04
Kendall	19.81	9.41	3.22	0	0	32.44
Knox	56.29	22.39	0	1.86	0	80.54
Lake	68.47	46.74	6.17	91.22	0	212.60
LaSalle	144.55	37.31	9.63	0	2.61	194.10
Lawrence	39.53	0	3.63	0	0	43.16
Lee	10.90	74.02	0.44	11.65	3.21	100.22
Livingston	126.56	38.90	4.74	12.11	5.49	187.80
Logan	7.44	23.94	3.18	0	0	34.56
Macon	62.46	16.43	0	0	0	78.89
Macoupin	27.51	44.46	0.56	3.35	0	75.88
Madison	40.15	60.12	10.46	32.45	1.40	144.58
Marion	50.91	6.61	0.26	0	0	57.78

TABLE 20—Concluded.

County.	State bond issue.	Federal aid.	State aid.	County 15d.	Miscellaneous.	Total.
Marshall	43.76	26.21	0	0	0	69.97
Mason	13.88	36.51	0.57	3.26	0	54.22
Massac	4.14	9.66	0	0	0	13.80
McDonough	38.01	41.55	0	0	0	79.56
McHenry	64.61	42.85	3.88	0	0	111.34
McLean	97.91	92.58	1.85	5.33	0.14	197.81
Menard	14.31	13.44	1.53	1.99	0.95	32.22
Mercer	21.79	11.65	0	0	0	33.44
Monroe	19.54	14.86	0.47	0.36	0	35.23
Montgomery	28.47	34.19	0	0	0	62.66
Morgan	38.54	6.12	1.61	0.37	0	46.64
Moultrie	28.41	15.47	2.91	0	0	46.79
Ogle	64.73	37.50	8.04	18.76	2.31	131.34
Peoria	53.97	62.48	5.10	21.24	0.46	143.25
Perry	42.81	31.62	0	0	0	74.43
Piatt	42.21	7.59	5.78	11.04	0	66.62
Pike	29.00	18.36	3.78	0	0	51.14
Pope	0	10.99	0	0	0	10.99
Pulaski	6.21	17.38	0.69	0	0	24.28
Putnam	19.57	6.43	0.99	1.58	0	28.57
Randolph	43.30	21.87	0	0	0	65.17
Richland	24.44	7.35	0	0	0	31.79
Rock Island	42.25	2.74	1.84	16.04	0	62.87
Saline	52.95	20.22	1.55	0	0	74.72
Sangamon	43.53	68.41	8.54	28.66	0	149.14
Schuyler	12.20	34.03	1.63	5.15	0	53.01
Scott	20.76	0	0	0	0	20.76
Shelby	80.99	0	0.61	0.60	0	82.20
Stark	25.16	15.81	0	0	0	40.97
St. Clair	57.40	44.81	3.01	71.29	0.53	177.04
Stephenson	30.61	13.12	3.26	1.79	0	48.78
Tazewell	31.41	47.27	1.51	5.07	0.05	85.31
Union	11.36	10.87	0	0	0.93	23.16
Vermilion	89.52	5.99	1.15	142.66	2.80	242.12
Wabash	24.52	0	1.72	0	0	26.24
Warren	39.27	20.35	1.09	1.14	0	61.85
Washington	54.10	0.42	0	0	0	54.52
Wayne	47.32	0	0	0	0	47.32
White	46.61	5.85	6.20	0	0	58.66
Whiteside	21.94	64.50	6.61	4.27	2.91	100.23
Will	98.11	67.33	11.96	36.34	0.78	214.52
Williamson	37.16	0	0.12	11.60	0	48.88
Winnebago	34.70	4.78	7.34	47.91	0	94.73
Woodford	65.00	26.60	0	0	0	91.60
Total	4,234.93	2,255.91	259.44	1,668.76	30.48	8,449.52

NOTE.—The above totals include the following various types.

Concrete	7,976.80
Brick	173.65
Sheet asphalt	34.21
Bituminous concrete	6.87
Bituminous macadam	16.15
Waterbound macadam	54.88
Gravel	186.96
Total net mileage available for traffic	8,449.52

4. GRADING.—Considerable progress has been made in the last few years in the development of equipment and methods for moving earth. The slip scraper, wheel scraper and similar equipment have disappeared gradually from the heavy grading jobs and are used economically only on paving sections where the earth work average 4,000 to 5,000 yards per mile. In every place possible, the grading contractor has substituted machinery for men and teams. The elevating grader and steam shovel are the common types of equipment used in earth moving. The former now utilizes the caterpillar tractor as a means of traction. For hauling, the string of dump wagons with "mule skinners" and

"three-ups" has been replaced by dump wagons of large capacity drawn either singly or in a train by tractors, or by crawler dump wagons "iron mules" and similar heavy hauling equipment. The present grading contractor figures at least 100,000 cubic yards of earth work per season, and the old time earth mover who is not capable of keeping in this class, has either turned to other fields or become a sub-contractor under the responsible principal contractor. During the calendar year 1929, 178.23 miles of heavy grading, consisting of 5,877,132 cubic yards of earth work, were completed.

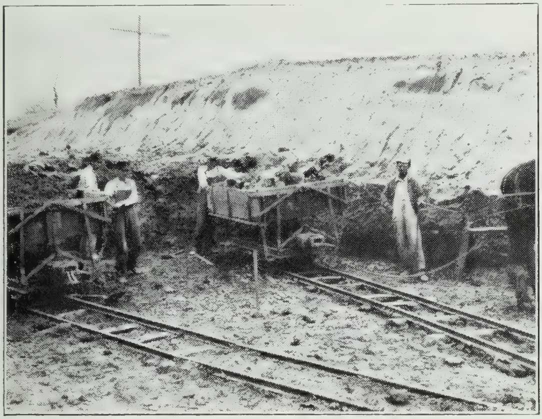


Figure 27.—Novel method of handling rock excavation. Route 146 west of Golconda.

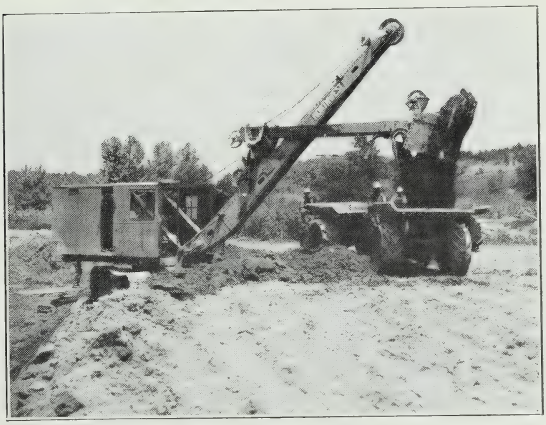


Figure 28.—Excavation by modern equipment and construction methods.

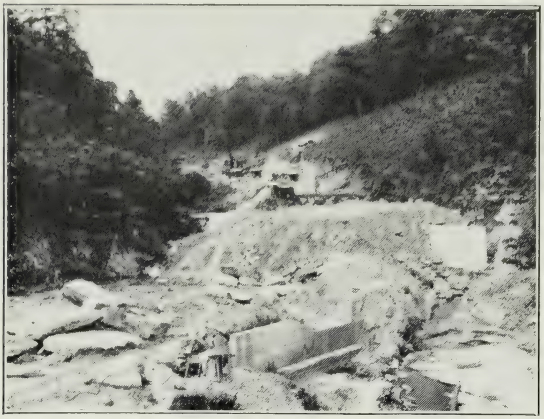
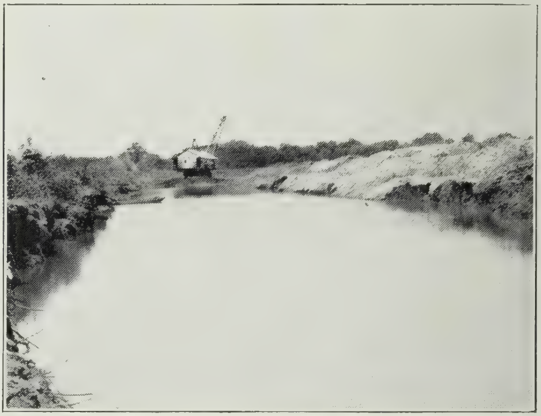


Figure 29.—Route 109 near Grafton. Heavy grading through rock cut.

Figure 30.—Channel change in Pecatonica River, Route 74, near Freeport.



5. BRIDGES.—During the calendar year 1929, 215 bridges involving 82,730.2 cubic yards of reinforced concrete and 11,171,926 pounds of structural steel were completed.

Material progress was made during 1929 on the three bridge projects of the Illinois River. The new lift bridge at LaSalle was opened to traffic December 1. The construction work on a similar type structure at Pekin was in such shape at the close of the year that by February 1, the traffic should be able to use this bridge. Work on the longest bridge of the three, at Florence, will probably be completed by May 1, 1930. All of the foundation and substructure work has been completed and only one span of the superstructure remains to be built, together with the installation of the lift equipment.

Through the cooperation of the Bridge Office, a new design of approach span bridge was built at Florence during 1928. This is a concrete design consisting of a substructure of reinforced concrete pile bents with concrete gaps and a superstructure of steel I-beams with concrete floors and spindle rails. This type of construction proved very practical. It is appreciably cheaper than the standard reinforced concrete design, durable and very pleasing in appearance. There is also a distinct advantage in building this type of bridge over the old method of constructing an approach grade of earth. The latter requires invariably an unsightly barrow pit and the fill will be subject to settlement for several years. A temporary surfacing must be maintained at high cost and the danger of damage from floods and shoulder wash is always great. The new design may cost more than the earth approaches but it eliminates all the undesirable features just mentioned. Several of these bridges were designed and put under contract during 1929.

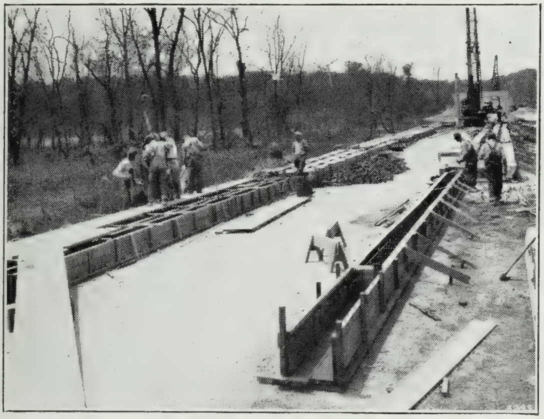
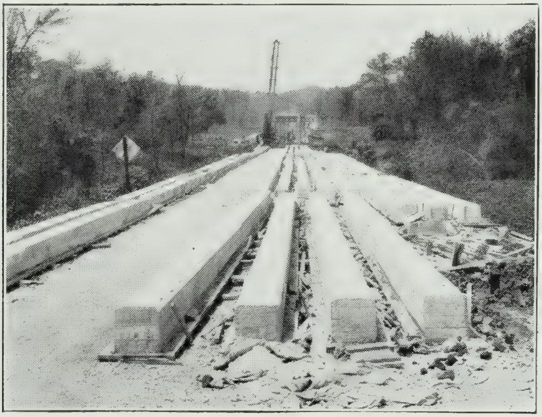


Figure 31.—Pouring concrete piles for approach to Illinois River bridge at Florence.

Figure 32.—Curing concrete piles for approach to Illinois River bridge at Florence.



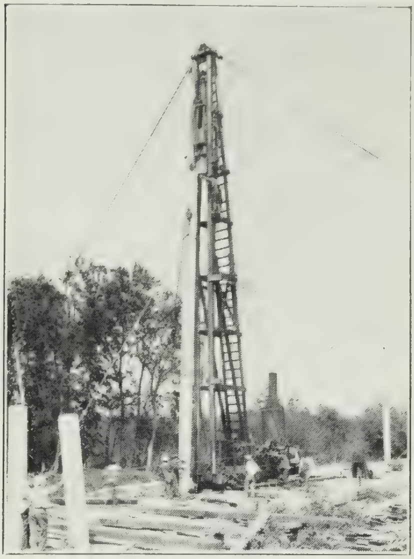
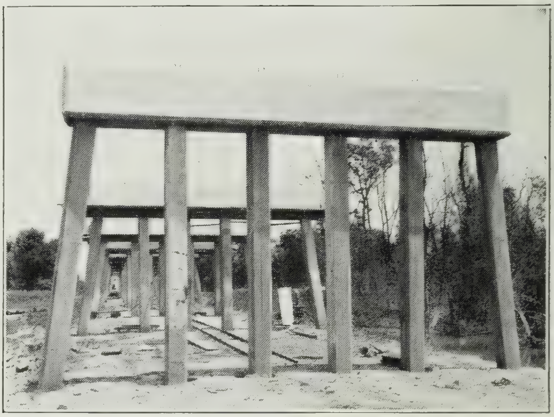


Figure 33.—Driving the concrete piles for approach to Illinois River bridge at Florence.

Figure 34.—Piles in place with concrete cap for approach to Illinois River bridge at Florence.



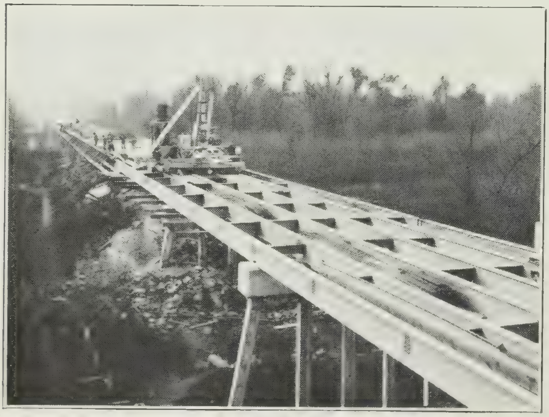


Figure 35.—Placing the steel floor system for approach to Illinois River bridge at Florence.

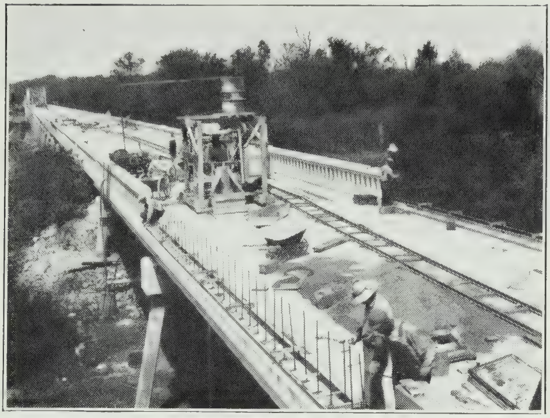


Figure 36.—Approach to Illinois River bridge at Florence showing concrete floor and construction of concrete hand rail.

6. GRADE SEPARATIONS.—Twenty-six grade separations were completed in 1929 and fifteen put under contract. This exceeds the achievement of any previous year and indicates an important step in the elimination of dangerous grade crossings and bad detours which have been a menace to traffic and have caused bottle necks in our highway system. Tables 5 and 6, in the report of the Bureau of Design, show the location of these grade separations.

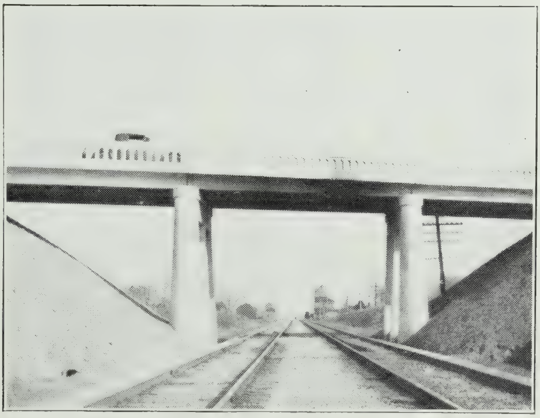


Figure 37.—Grade separation over Wabash Railroad on Route 160 near Carpenter.

7. DAY LABOR CONSTRUCTION.—Due to the fact that it is impossible to pave many of our short heavy fills at the time the pavement is placed adjacent, the number of such unpaved stretches has accumulated rapidly during the past few years. It has been common practice to maintain them with gravel or crushed stone until they are settled thoroughly.

Since the paving of these gaps can be done only at considerable expense and with inconvenience to traffic, it was decided during 1929 to use the Day Labor outfits, as it was felt that such equipment was adopted especially for work of this calibre. A rational bid for the construction of one gap is difficult and often times the contractor must figure on hazards which may not occur but which he must be protected against. By Day Labor only the actual cost results.

There is always the problem of handling traffic and frequently it is necessary to build the pavement in two strips, maintaining traffic on one side. Under day labor, the matter of directing traffic and the order of construction will be entirely within our own jurisdiction and the work can be done at a time and in a manner most advantageous to traffic requirements. The sections and gaps paved by Day Labor during 1929 are shown in Table 21.

TABLE 21—SECTIONS COMPLETED BY STATE DAY LABOR OUTFITS.

Route.	Section.	Type.	Width in feet.	Length in miles.
126	110	Concrete	18	9.05
126	111	Concrete	18	5.76
126	112	Concrete	18	8.36
126	117	Concrete	18	2.31
108	101	Concrete	18	.89
108	104	Concrete	18	4.53
108	105	Concrete	18	1.52

GAPS COMPLETED BY STATE DAY LABOR OUTFITS.

98	108-Ext.	Concrete	18	.11
3	56-X	Concrete	18	.45
3	59-X	Concrete	18	.30
36	20-A	Rip Rap	----------	----------
107	104-A	Rip Rap	----------	----------
24	8-X	Concrete	20	.19
4	6-VX	Concrete	18	.35
7	S-2	Concrete	18	.53
39	1-X	Concrete	18	.30
2	70-E	Concrete	Variable	.25
2	70-F	Gravel	18	.17
7	31-X	Concrete	18	.11
17	28-V-2	Concrete	18	.27
5	25-X	Concrete	18	.08
26	4-V-1	Concrete	18	.31
2	73-V-2	Concrete	18	.14
2	75-X	Concrete	18	1.32
37	1-X	Concrete	18	.94
Total	----------	----------	----------	38.24

As has been stated, Day Labor construction was continued in 1929 by four State-owned construction units under the direction of the

Superintendent of Day Labor and the work assigned consisted of the entire construction of certain sections of road, including grading, drainage structures, paving, shoulders, and all other phases of construction involved such as the settlement of fills, handling traffic, etc. In addition to the paving work, rip rap was placed on the approach to the Louisiana bridge and on the approach to the Florence bridge.

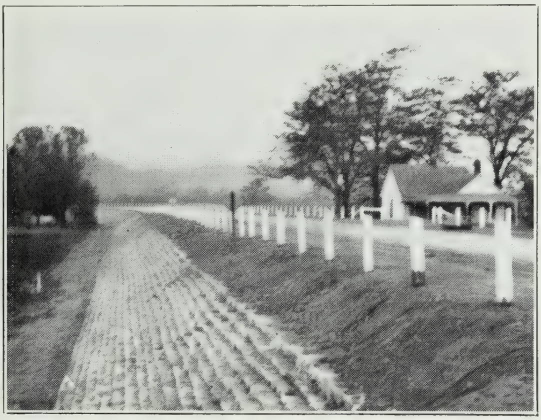


Figure 38.—Riprap used to prevent wash on side slopes, Route 107, near Louisiana.

The work carried on by the Day Labor forces was widely separated, the twenty-five sections constructed being distributed over practically all sections of the State. The assignment of the various construction units was as follows: Two outfits were assigned work of ordinary character, one outfit worked exclusively on gaps and a fourth worked on both ordinary sections and on gap work. The engineering and inspection were handled in the regular manner by the district engineer in whose district the work was located.

8. CEMENT.—On March 22, 1929, the Department of Public Works and Buildings asked for bids for three million barrels of cement and twenty companies competed, offering 16,907,000 barrels. In making awards, the number of companies was cut down to nine and limited to those actually operating in Illinois or located very close to the border. This policy gives an advantage to Illinois products and it may be reflected directly in the cost of our concrete pavement. In the first place, limiting to a smaller number of companies results in less inspection cost at the mill. With companies located within the State borders or very close to them, the car mileage from mill to job is materially less. If cement is ordered one day, it is almost certain of being on the job the next day or at the most in two days which cuts down the necessity for storage thus eliminating useless cost. Finally it would appear that such a policy must reflect directly on the profits of the cement company. It is now common practice for companies to compete in all territories. The closest mill sets a base price and the more distant com-

panies meet it in their quoted prices f. o. b. the destination. By absorbing the extra freight rate charge, consequently, a minimum car haul produces a low freight charge and any reduction in freight allows a greater mill net, with increased profit to the cement company. Naturally this must result ultimately in a saving to the State.

Due to apparent over production of cement or competition in certain sections of United States, there were very sharp price reductions on August 23, 1929, which resulted in a lowering of prices from fifteen cents to twenty-five cents per barrel on practically all cement shipped after that date. This resulted in an appreciable saving to the State.

9. CRUSHED STONE.—The output of crushed stone from the Joliet penitentiary was materially increased during 1929 and very nearly filled the requisition on file for the various townships. In addition, considerable material was shipped to this Department for use on the State Bond Issue System, particularly for maintenance purposes, and to other State institutions.

Shipments from the Menard penitentiary were limited. There were a large number of requests on file from the townships, but due to the intermittent shipping schedule, the local officials have become almost inactive in the matter of receiving stone. It is costly to make arrangements to handle stone unless regular shipments are certain. Many townships now prefer to purchase from commercial quarries with an assurance of receiving shipments in regular quantities at a fixed time. The road funds of many of the townships adjacent to Chester are not large and it is of great advantage to give them all assistance possible, particularly in the development of a secondary road system.

Two important items relating to the distribution of crushed stone were made evident during the year:

(a) A desirability of utilizing penitentiary stone on the State Bond Issue System, first as the temporary surfacing on gaps which cannot be paved for several years on account of heavy fills, and second for maintenance of the shoulders adjacent to the pavement, and for side road approaches to the pavement. A large amount of crushed stone or gravel is required for this purpose and a large saving in cost would result if penitentiary stone were available.

(b) An adjustment of equipment is desirable particularly at the Joliet penitentiary, to produce a greater quantity of chip stone and screenings. The townships adjacent to Joliet have been constructing crushed stone roads for a number of years and many of them require an appreciable amount of maintenance each year. The present gradations of stone at the penitentiaries provide only enough screenings to bind the coarse material; therefore, when requests for chipped stone and screenings for maintenance purposes are received, in most instances they cannot be granted, and if the orders can be filled, it is generally after a long wait. The installation of a different crusher or additional screen arrangement would provide a greater production of the smaller size stones.

As in the past, the output of crushed stone from the two penitentiaries is still in the stage where further development of both plants is desirable. It is safe to state, without reservation, that if the production at Joliet were doubled, allocation of the entire quantity could be obtained. At Chester the demand for stone has never been so great but it is certain that its output should be increased materially. Table 22 shows the distribution of crushed stone during 1929.

TABLE 22—TABLE SHOWING CUBIC YARDS OF CRUSHED STONE REQUISITIONED AND SHIPPED FROM THE JOLIET AND MENARD PENITENTIARIES.

	Joliet.		Menard.		Total.	
	Requisitioned, cu. yds.	Shipped, cu. yds.	Requisitioned, cu. yds.	Shipped, cu. yds.	Requisitioned, cu. yds.	Shipped, cu. yds.
S. B. I. construction	1,500	1,512			1,500	1,512
S. B. I. maintenance	11,488	7,893	1,906	1,280½	13,394	9,173½
Townships	55,523	43,272	23,187	3,264	78,710	46,536
State institutions	8,026	6,984			8,026	6,984
Total	76,537	59,661	25,093	4,544½	101,630	64,205½

10. CORE DRILL OUTFITS.—Four core drill outfits operated during 1929 and cores were taken on each section of pavement as a check on thickness and quality of concrete, the distribution being as follows:

District	1	2	3	4	5	6	7	8	9	
Number of cores	3,193	979	1,812	1,282	180	573	232	748	442	—Total 9,441

In addition to routine work, the following investigational work was carried on through the medium of the core drill outfits:

(a) In order to determine the effect of pavement blow-ups on the strength of the concrete immediately adjacent to the point of fracture, numerous cores were taken in the vicinity of each blow-up. These cores were tested by the Bureau of Materials and some definite information was obtained.

(b) It has become a regular practice where extensive scaling is encountered, to take cores in the scaled spots and adjacent to them in order to determine the strength of the pavement at those points. It is our desire to determine, if possible, whether scaling is simply a surface condition which does not in any way affect the strength of the pavement underneath or whether it is actually the beginning of disintegration of the entire spot. From the results obtained thus far, it appears that scaling does not affect the strength or quality of the pavement beneath it or adjacent to it. Scaled spots are cored each year to determine whether or not there is any further disintegration or loss in strength, and in order to study the strength of our pavements over a period of years, certain sections have been selected throughout the State and they are cored annually. We hope to obtain figures which can be studied and from which some conclusions can be drawn. To date, the experiment has not proceeded far enough to obtain any definite results.

The cores taken on this investigational work are as follows:

	No. Sections Cored	No. Cores Taken
At blow-ups	26	622
At disintegrated spots	7	378
At scaled spots	10	350
Early strength data	9	101

11. FREIGHT RATE DIVISION.—The duties of the Freight Rate Division of the Bureau are to check the freight rate charges on all materials to see that they agree with the established rates published at the time of the award of the contract and in case there are any changes, adjustments may be necessary. This division also cooperates with the Commerce Commission in the matter of freight increases and in numerous instances proposed increases have been rejected or deferred when it was demonstrated that their establishment would increase the cost of our pavements.

12. CONSTRUCTION POLICIES.—There were a few outstanding construction policies adopted during the year 1929. The quantity and quality of concrete were checked more carefully than before. The practice of taking cores on each section of pavement as a check on thickness was continued as in past years.

The compression test was made on practically every job to check strength and quality of the concrete. Used beams were made up daily after the pavement was bored. The value of this test demonstrated itself early in the season, when the first specimens on a certain section indicated low strength. An investigation of the materials showed at once the cause of this loss in strength and a correction was made before any appreciable amount of pavement had been laid. Test beams also indicate the time when the pavement is strong enough to be opened to traffic. This is of real practical value when it is important to open the road in the shortest possible length of time, particularly on gaps, to avoid long detours on sections adjacent to bridges, on city streets, and at important intersections.

Proportioning concrete aggregates by weight was further studied during 1929, and the results are so satisfactory that this method will be a requirement in the new specifications. An investigation of strength of concrete in bridges, as shown by testing cylinders, has led to the conclusion that a more careful proportioning of aggregates will give a more uniform and higher strength. As the result the new specification for concrete in bridges and culverts will require proportioning by weight.

The construction of 4-inch expansion joints, placed at 800′ intervals, was continued during 1929 on all concrete pavement. A careful study of the results of this type of construction must be made before any definite conclusions are drawn.

During 1928 the Department decided to increase the strength of concrete in bridge footings by changing to a 1:2:3½ mix. This policy was established permanently in 1929.

For several years the Bureau of Materials has been investigating the strength of cement kept in storage for an appreciable length of time, giving particular study to storage during the winter months. The results of these investigations have proved conclusively that there is a definite loss in strength of cement when kept in storage during the winter months and that there is also a certain loss in strength of cement kept in storage an appreciable length of time. As the result of this investigation, a careful check test is required on all future stored cement before it may be used. In addition all cement kept through the winter must be screened and resacked and then must be mixed with new cement in the proportion of three sacks of new to one sack of old cement.

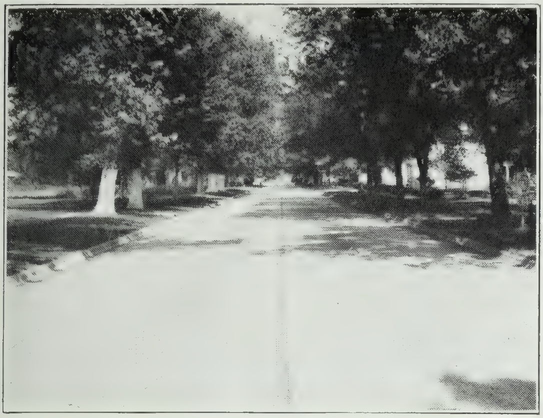


Figure 39.—State bond issue pavement widened through a village by local authorities.

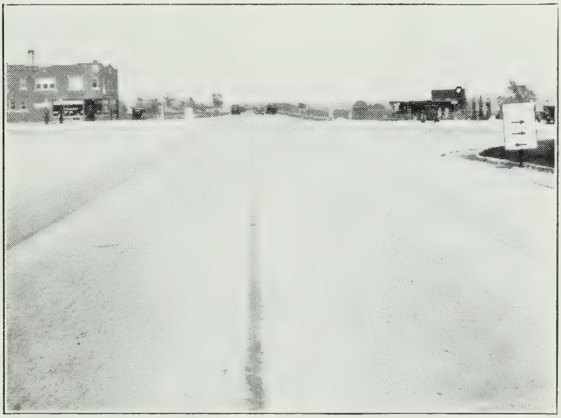


Figure 40.—Widened intersection, in metropolitan area around Chicago.

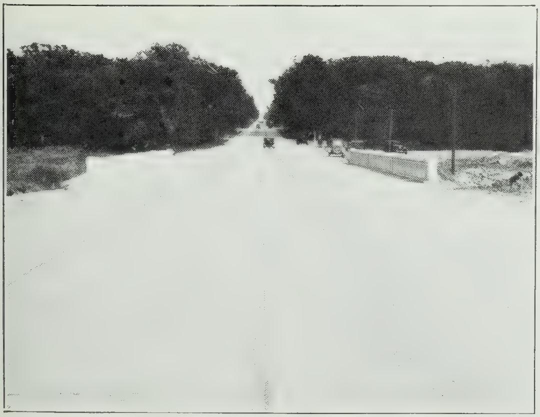


Figure 41—40-foot pavement construction inside metropolitan area around Chicago.

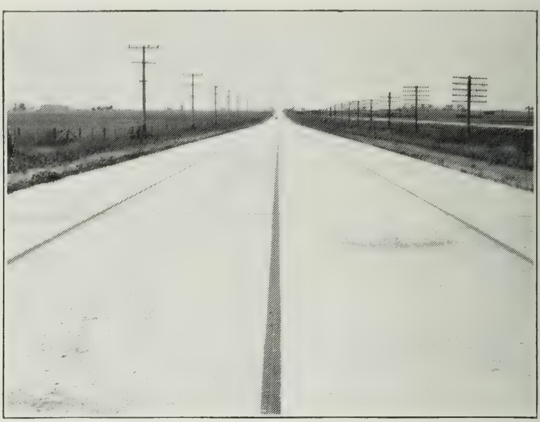


Figure 42.—40-foot pavement construction adjacent to metropolitan area around Chicago.

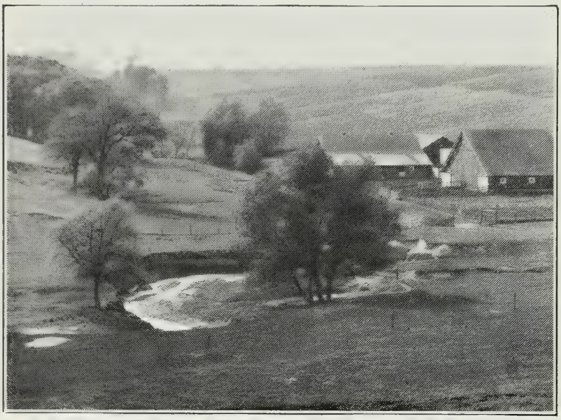


Figure 43.—Route 40, Carroll County, before construction.

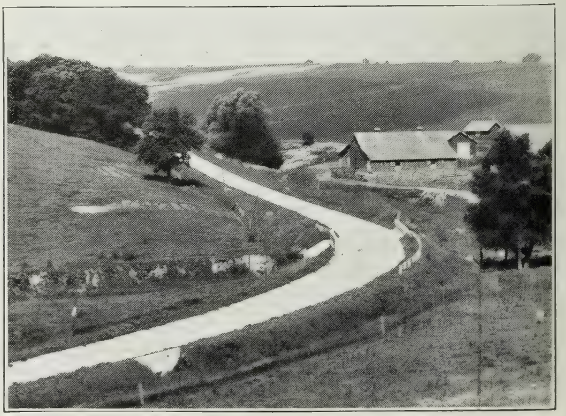


Figure 44.—Route 40, Carroll County after construction.

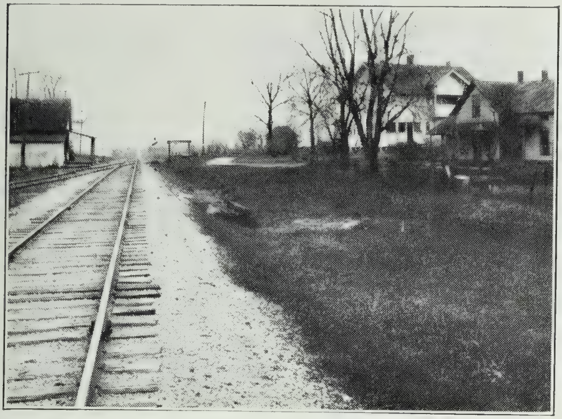


Figure 45.—Portion of Route 121 before construction. Center line of proposed improvement passes through line of trees in the foreground.

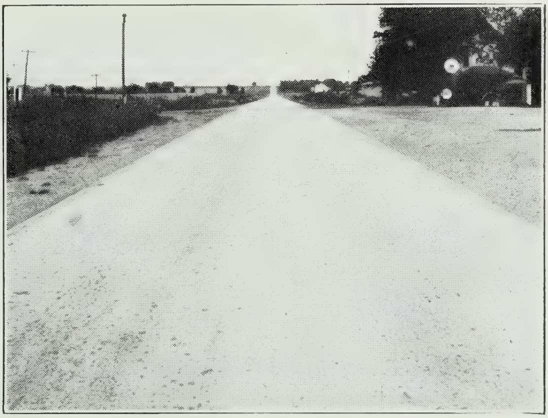


Figure 46.—The portion of Route 121 shown in Figure 45 after construction. Note removal of several buildings to make possible railroad location.

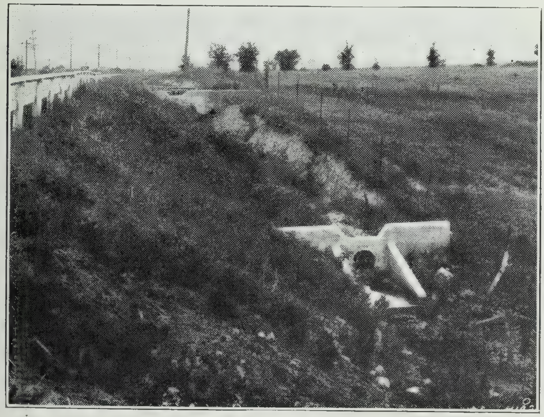


Figure 47.—Special baffle walls to prevent ditch wash.

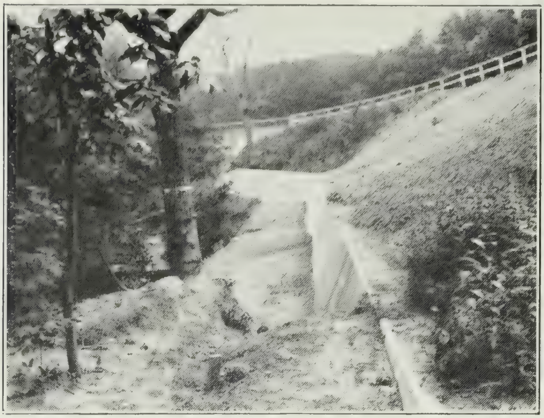


Figure 48.—Heavy retaining wall built to prevent sliding of a fill in Starved Rock Park, LaSalle County.

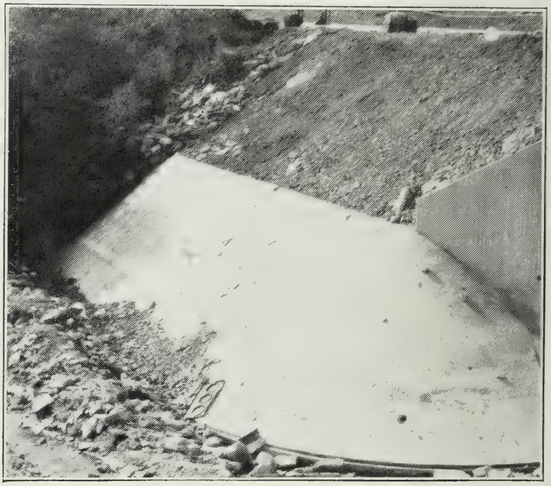


Figure 49.—Concrete slope wall to protect fill against stream wash.

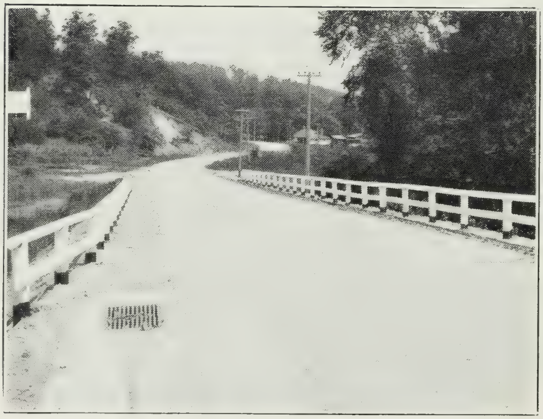


Figure 50.—Special gutter section outlet to prevent shoulder wash on heavy grades.

IV. BUREAU OF MATERIALS.

1. DUTIES.—The duties of the Bureau of Materials include:

a. The inspection of all materials used in the construction and maintenance of roads and bridges built by the State.

b. The inspection of materials used in the construction of roads and bridges built by the counties under section 15-d of the State Aid Act.

c. The inspection of materials used by the counties and townships in work not under State supervision, when requested.

d. The investigation of new materials, methods of tests, and methods of pavement design and construction.

e. The storage and transportation of all paint used in State construction and maintenance work.

f. The preparation of specifications.

g. The preparation of reports of all research and investigations carried on by the Bureau of Materials.

h. The photographic work of the Division of Highways.

i. Special mechanical services.

j. Miscellaneous work incidental to materials and tests.

Both the office and field activities of this Bureau are carried on under the direct supervision of the Engineer of Materials, but materials engineers are stationed at each district office to expedite the work in the various districts. The inspection work is carried on, as far as possible, by inspectors located at the material plants, thus affording prompt service to the producers and contractors. The research and investigations are carried on in both the laboratory and field and have been the means whereby reliable and improved design data have been secured, new material resources have been developed, tests for determining the quality of the materials have been improved so as to standardize the quality of the materials accepted for highway work and specifications have been evolved which insure the use of suitable materials and satisfactory construction practices.

2. LABORATORY INSPECTION OF MATERIALS. — The chemical and physical laboratories are equipped to make complete tests of nearly every type of highway material as well as tests of the concrete used in the construction work. A total of 18,482 samples were tested in these laboratories during 1929. These samples may be divided on the basis of type into: preliminary samples 112, acceptance samples 1601, check samples 1491, quality samples 15,278; on the basis of material represented into: highway materials 3453, bridge cylinders 1282 and pavement cores 13,747; on the basis of the distribution of the work into: chemical laboratory 1539, physical laboratory 16,011 and both chemical and physical laboratories 932; and on the basis of the account to which they are charged into: Division of Highways 17,615, State Aid 15-d 162, County and Township 546 and other State Departments 159. Detailed reports of the 1929 laboratory inspection are given below.

a. Preliminary Samples.—This class of samples consists of specimens submitted by manufacturers and producers to secure information concerning the suitability of their products for State work, or to show the quality of their products when bidding for State contracts. Acceptance of preliminary samples is never considered as acceptance of future shipments of the materials, but the work done in this class of samples has been the means whereby material sources have been developed and delays avoided in the purchase of quality products for State work.

Table 23 shows the number of preliminary samples tested in the Springfield laboratories during 1929 and the distribution of the work on these samples.

TABLE 23—PRELIMINARY SAMPLES TESTED IN THE SPRINGFIELD LABORATORIES DURING THE CALENDAR YEAR 1929.

Account.	Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Division of Highways	Aggregate		16		16
	Asphalt	8			8
	Creosote	1			1
	Gasoline	2			2
	Lubricants	14			14
	Paint materials	12			12
	Rock		5		5
	Steel		10		10
	Miscellaneous	11			11
State Aid—15d	Aggregate		1		1
	Rock		3		3
	Steel		3		3
Counties and townships	Aggregate		5		5
	Creosote and tar	8			8
	Road oil	9			9
	Miscellaneous	4			4
Total		69	43	0	112

b. Acceptance Samples.—This class of samples consists of representative samples of materials which have arrived at the construction site without previous inspection; materials which can not be inspected in the field on account of the intricate nature of the chemical and physical tests required; or materials which are to be shipped from plants or the warehouses in quantities which will not warrant inspection at the source. Trained engineers, employed by the State, secure these samples and send them to this Bureau for examination. The work done on this class of samples has protected the interests of the State with a minimum of expense and loss of time.

Table 24 shows the number of acceptance samples tested in the laboratories during 1929 and the distribution of the work on these samples.

c. Check Samples.—This class of samples consists of representative samples of materials which have been stored for considerable length of time or stored in an unapproved manner; materials which do not appear satisfactory when received on the work; or materials used to check the quality of the products of manufacturers and producers, or

TABLE 24—ACCEPTANCE SAMPLES TESTED IN SPRINGFIELD LABORATORIES DURING CALENDAR YEAR 1929.

Account.	Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Division of Highways	Aggregate		2		2
	Asphalt	52			52
	Calcium chloride	46			46
	Cement		192	16	208
	Creosote and tar	20			20
	Gasoline	1			1
	Lubricants	12			12
	Paint materials	40			40
	Rock		9		9
	Steel		118		118
	Water			40	40
	Miscellaneous	138	72	64	274
State Aid—15d	Aggregate		1		1
	Asphalt	1			1
	Calcium chloride	7			7
	Cement		48	24	72
	Creosote and tar	3			3
	Paint materials	4			4
	Steel		10		10
	Water			12	12
	Miscellaneous	4			4
Counties and townships	Aggregate		34		34
	Cement			1	1
	Road oil	457			457
	Miscellaneous	19			19
Other State departments	Aggregate		5		5
	Cement		13		13
	Lubricants	119			119
	Paint materials	13			13
	Steel		1		1
	Water			1	1
	Miscellaneous	2			2
Total		938	505	158	1,601

to check the inspection work of the plant inspectors, such as samples of cement received at frequent intervals from the different cement mills for check tests on the chemical and physical properties of the material produced at these mills.

Table 25 shows the number of check samples tested in the Springfield laboratories during 1929 and the distribution of the work on these samples.

TABLE 25—CHECK SAMPLES TESTED IN SPRINGFIELD LABORATORIES DURING CALENDAR YEAR 1929.

Account.	Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Division of Highways	Aggregate		149		149
	Asphalt	15			15
	Cement	413	116	722	1,251
	Lubricants	2			2
	Paint materials	3			3
	Rock		1		1
	Steel		2		2
	Miscellaneous	15	12		27
State Aid—15d	Cement		1	40	41
Total		448	281	762	1,491

d. Quality Samples.—This class of samples consists of representative specimens of the products of the various manufacturers and producers of highway materials. They are subjected to detailed tests in order to secure more complete information regarding the quality of the materials than is brought out by the regular plant inspection, and to secure more complete information concerning the quality of the products of the various producers. These samples are also used for the study and development of quality tests. The majority of these detailed quality tests are conducted during the winter months in anticipation of the next construction season and because of the fact that since the regular testing work is greatly reduced at this time, the testing equipment and men are available for this kind of work.

Quality tests have been made each winter since 1924, on samples from the various sand and gravel plants and from the various stone quarries, making shipments for construction work in Illinois. During the winter of 1929, the data secured by these tests were compiled in such a manner that detailed information regarding the material produced at each plant is now available.

Table 26 shows the number of quality samples tested in the Springfield laboratories during 1929 and the distribution of the work on these samples.

TABLE 26—QUALITY SAMPLES TESTED IN SPRINGFIELD LABORATORIES DURING CALENDAR YEAR 1929.

Account.	Material.	Chemical laboratory.	Physical laboratory.	Chemical and physical laboratories.	Total.
Division of Highways	Aggregate		97		97
	Asphalt	7			7
	Bridge cylinders		1,282		1,282
	Lubricants	5			5
	Paint materials	8			8
	Pavement cores		13,747		13,747
	Rock		46		46
	Water			7	7
	Miscellaneous	60		5	65
Counties and townships	Aggregate		7		7
	Road oil	2			2
Other State departments	Miscellaneous	2	3		5
Total		84	15,182	12	15,278

e. Materials Accepted by Laboratory Inspection—1929.—Table 27 shows the quantity of materials accepted by the Springfield office during 1929 on the basis of tests on representative samples.

3. PLANT INSPECTION OF MATERIALS.—Plant inspection of aggregates was started in 1920 and it met with such favor that this type of inspection has been generally adopted for all kinds of materials entering highway construction. Whenever manufacturers and producers ship appreciable quantities of their products, inspection is carried on at the source of the material by inspectors employed and trained by the Bureau of Materials. Plant inspection protects the producers from losses which occur through rejections at destinations; reduces the costs

TABLE 27—QUANTITIES REPRESENTED BY ACCEPTANCE SAMPLES TESTED IN SPRINGFIELD LABORATORIES DURING CALENDAR YEAR 1929.

Account.	Material.	Amount.
Division of Highways	Asphalt	1,627,300 lbs.
	Calcium chloride	3,416,400 lbs.
	Cement	34,645 bbls.
	Creosote and tar	300,000 gals.
	Chain link guard fabric	144.000 lineal ft.
	Culvert pipe (corrugated metal)	7.529 lineal ft.
	Concrete tile	348 lineal ft.
	Denatured alcohol	3.825 gals.
	Expansion joint	36.970 lineal ft.
	Paint materials	27,600 gals.
	Snow fence	88,500 lineal ft.
	Steel	1,141,922 lbs.
	Wheel load weighers	100
State Aid—15d	Asphalt	8,000 lbs.
	Calcium chloride	261,750 lbs.
	Cement	12.418 bbls.
	Creosote	250 gals.
	Expansion joint	12,350 lineal ft.
	Paint materials	275 gals.
	Steel	72,726 lbs.
Counties and townships	Aggregate	1,110 cu yds.
	Cement	150 bbls.
	Culvert pipe (corrugated metal)	3.132 lineal ft.
	Road oil	4.570.000 gals.
Other State departments	Aggregate	25,000 cu. yds.
	Cement	3,483 bbls.
	Culvert pipe (corrugated metal)	515 lineal ft.
	Steel	6.000 lbs.

of materials by providing for more efficient plant operation; expedites the work of the contractors by preventing shipments of unsatisfactory materials to the job and consequent delays attending their disposal; and provides better control of the quality of materials. Plant inspectors are placed so as to give the best service at a minimum of expense and loss of time to the producers. In a number of instances, a single inspector will cover more than one plant.

The quantity of materials accepted at plants for highway work in Illinois and the unit costs of inspection for the calendar year 1929 are shown in Table 28. The quantity of materials inspected for other de-

TABLE 28—QUANTITY OF MATERIALS ACCEPTED, FOR ILLINOIS HIGHWAY WORK, BY PLANT INSPECTION AND UNIT COST OF INSPECTION FOR THE CALENDAR YEAR 1929.

Material.	Total quantity accepted.	Unit cost inspection.	
		Without overhead.	With overhead.
Aggregate	2,585.712 cu. yds.	$0.038 cu. yd.	$0.048 cu. yd.
Asphalt	3,786.19 tons	0.33 ton	0.389 ton
Cedar posts	29,638	0.016 each	0.018 each
Cement	2,933.458½ bbls.	0.011 bbl.	0.015 bbl.
Corrugated metal culvert pipe	11,176 ft.	0.019 ft.	0.025 ft.
Lumber	902.333 bd. ft.	1.017 M bd. ft.	1.114 M bd. ft.
Paint	23.435 gals.	0.016 gal.	0.019 gal.
Paving brick	2.256.300	0.172 M	0.223 M
Signs (embossed metal)	21.570	0.021 each	0.024 each
Steel	18.752.2 tons	0.496 ton	0.62 ton

In addition 42,142 tile, 2,020 cedar posts, 1,650,312 bd. ft. lumber and 711.5 tons steel were inspected at various plants and destinations. No inspection cost available due to small quantity shipments.

partments of the State of Illinois and for other states during 1929 are shown in Table 29. A comparison of the data given in these tables with that of former years shows that there was a reduction of the quantity of materials inspected during 1929 but that this reduction was in direct proportion to the construction activities carried on. Unit costs for this work showed a slight increase for the calendar year 1929 as compared with former years.

TABLE 29—QUANTITIES OF MATERIALS INSPECTED FOR OTHER DEPARTMENTS OF THE STATE OF ILLINOIS AND FOR OTHER STATES DURING THE CALENDAR YEAR 1929.

Account.	Quantity inspected.			
	Aggregate.	Cement.	Lumber.	Steel.
State of Illinois—				
Dept. of Public Welfare		2,300 bbls.		22,093 lbs.
Division of Waterways	193,306 cu. yds.	253,852 bbls.		
Pine Forest State Park		739½ bbls.		
Other states	31,575 cu. yds.	150,830¾ bbls.	151,692 bd. ft.	15,102,252 lbs.
Total	224,881 cu. yds.	407,722¼ bbls.	151,692 bd. ft.	15,124,345 lbs.

Detailed reports of the 1929 plant inspection of the various materials listed in Table 28 are given below:

a. Aggregates.—The quantities of aggregates which were accepted are shown in Table 30.

TABLE 30—QUANTITIES OF AGGREGATES ACCEPTED.

Account.	Material.	Quantity.
State of Illinois—		
Division of Highways	Sand	723,682 cu. yds.
Division of Highways	Gravel	761,094 cu. yds.
Division of Highways	Crushed stone	518,483 cu. yds.
Division of Highways	Novaculite	935 cu. yds.
County—15d	Sand	198,480 cu. yds.
County—15d	Gravel	146,659 cu. yds.
County—15d	Crushed stone	200,480 cu. yds.
Straight, county and township	Sand	8,313 cu. yds.
Straight, county and township	Gravel	26,460 cu. yds.
Straight, county and township	Crushed stone	1,126 cu. yds.
Division of Waterways	Pit run gravel	193,306 cu. yds.
Other states	Gravel	26,000 cu. yds.
Other states	Sand	5,575 cu. yds.
Total		2,810,593 cu. yds.

The following quantities of aggregates were rejected: Sand, 30,825 cu. yds.; gravel, 31,155 cu. yds.; crushed stone, 9,738 cu. yds., making a total of 71,718 cu. yds.

To inspect these aggregates, plant inspection was maintained periodically at 86 sand and gravel plants and 32 crushed stone plants, making a total of 118 plants. The plants, for the most part were located in the State or closely adjacent territory. Approximately 28,000 samples were required to complete the inspection work and in addition to making mechanical analysis to determine the gradation of the aggregates and a test for the silt and clay content of each sample, the inspectors were required to be present during the loading operation in order to see that there was no refuse or foreign material in the bottoms of the cars. The inspectors were also required to make a report in triplicate on each car load or truck load of the material. The number of inspectors required to carry on the inspection of these aggregates varied in accordance with construction activities, the minimum number in the field at any one time being 37. The unit cost for this work was slightly higher than for 1928, but less than it was for 1927.

b. Asphalt.—The following quantities of asphalt were accepted for State work during 1929: Crack and joint filler, 6,003,604 lbs., brick filler, 1,316,068 lbs., cut-back asphalt, 30,447 gals. The above figures do not show the amount of inspection work necessary for the acceptance of this large quantity of material, however, as asphalt is inspected during the process of manufacture. This method gives the refinery an opportunity to correct the material before it leaves the still in case the preliminary tests show that the asphalt does not meet the requirements of our specifications. Several tests are often required before the material is brought to a satisfactory state. In addition to making these tests the inspectors check the lot and batch numbers when the material is loaded into the cars. Asphalt testing does not require full time inspectors; therefore engineers are sent out from the Springfield laboratory whenever this work is necessary. Only three men were in the field at any one time during 1929.

c. Cement.—The following quantities of cement were sampled, tested and passed at the mills by representatives of the Division of Highways.

Account	Quantity
State Bond Issue	2,197,250 bbls.
County—15d	626,674 bbls.
Straight, County and Township	18,704 bbls.
Division of Waterways	253,852 bbls.
Department of Purchases and Construction	3,040 bbls.
Other States	150,831 bbls.
Total	3,250,351 bbls.

This cement originated from 12 mills located in Illinois, Indiana, Missouri, Kansas and Iowa.

The inspection procedure consists of sampling the cement as it is being sacked and loaded into the cars. From ten to fifteen individual samples are taken from each car and tested in the laboratory for soundness and setting properties. Failure of any individual sample is cause for rejection of the entire car from which it was taken. Composite samples from each car are tested for strength at the ages of 7 and 28 days, and for fineness of grinding.

Laboratory facilities are essential for the conduct of examination tests and for this purpose small field cement laboratories are maintained at three of the largest producing plants. At the smaller plants the laboratory facilities of the cement companies are used. The work in each plant is in charge of a trained engineer and where the volume of shipments is more than the engineer in charge can handle, semi-technical or non-technical assistants are employed on a temporary basis.

d. Corrugated Metal Culvert Pipe.—During the calendar year 1929, 11,176 lineal feet of corrugated metal culvert pipe were inspected. This inspection did not require full time inspectors, therefore engineers were sent out from the Springfield laboratory whenever this work was necessary.

e. Drain Tile.—During 1929, 42,142 drain tile were inspected. These tile varied in size and type, as for example, 2,898 of this number were concrete pipe. Tile inspection was carried on mainly by the district engineers of materials and for the most part consisted of plant inspection.

f. Lumber.—The quantities of lumber, piling and posts which were accepted are shown in Table 31.

TABLE 31—QUANTITIES OF LUMBER, PILING AND POSTS ACCEPTED.

Account.	Quantity.
State of Illinois—	
Division of Highways—	
Lumber, treated and untreated	872,818 bd. ft.
Piling, treated and untreated	1,210,776 bd. ft.
Guard fence posts (white cedar)	656,820 bd. ft.
County—15d—	
Lumber, treated and untreated	10,020 bd. ft.
Piling, treated and untreated	270,572 bd. ft.
Guard fence posts (white cedar)	36,490 bd. ft.
Straight, County and Township—	
Lumber, treated and untreated	53,015 bd. ft.
Piling, treated and untreated	36,204 bd. ft.
Other States—	
Lumber, treated	140,868 bd. ft.
Piling, treated	10,824 bd. ft.
Total	3,298,407 bd. ft.

The quantities of timber products inspected during 1929 exceeds those of former years. This is due mainly to the fact that there were a number of exceptionally large bridges constructed during 1929, requiring large amounts of piling and lumber, the largest ones being the Shippingsport, Pekin and Florence bridges. Lumber inspection this year was carried on in Alabama, Mississippi, Arkansas, Missouri, Minnesota and Michigan, besides points in Illinois. Inspection of the greater portion of timber products was conducted at the source, permitting better control of the quality of the material. Lumber inspection differs widely from other highway materials as it is necessary to examine each individual piece instead of a sample representing a certain quantity. In case of the treated material especially, plant inspection enables the inspector to determine not only the quality of the material, but the preservative treatment as well.

g. Paint.—The following quantities of paint were accepted.

Material	Quantity
Basic sulphate blue lead paint	10,270 gals.
Basic carbonate white lead paint	13,165 gals.
Total	23,435 gals.

Since all of the paint used in construction and maintenance work is purchased directly by the Division of Highways and is handled by this Bureau it is best to maintain a rigid inspection over the paint. Preliminary samples are taken from the original materials which the manufacturer expects to use in the paint. If all of the materials are satisfactory, an inspector is sent to the factory to watch the grinding operations and the proportioning of the materials, to determine the weights per gallon of the various batches of the mixed paint and to check the total yield of the paint. Check tests are made from samples taken from the containers when they reach Springfield. The Bureau also keeps in touch with the application of the paint in the field and if trouble is experienced an investigation is made to determine and remedy the cause.

h. Paving Brick.—Plant inspection of paving brick during 1929 was carried on at only one plant, a total of 2,256,300 brick being inspected. Approximately 300 samples were tested in the inspection of these bricks.

i. Signs (Embossed Metal).—The following quantities of standard metal signs were accepted.

Material	Quantity
Sheet metal warning signs	12,170
Sheet metal route markers	9,400
Total	21,570

Before plant inspection of the finished signs is made the original sheet metal, the primer coat and the enamels which are to be used in the manufacture of the signs are tested in the laboratory. As the dies of the various signs are prepared by the manufacturer a sample of each sign is fabricated and inspected so that any discrepancies which might occur in the embossing, or depth of the embossing, may be changed in the dies before the signs are made. When the signs are fabricated and finished with enamel, inspection is made at the factory by one of our inspectors and all signs which show defects in the metal, in the embossing or in the finished enamel are rejected.

j. Steel.—The following quantities of reinforcing steel, structural steel and miscellaneous steel products which include road guard, steel posts, snow fence, etc., were inspected, tested and passed at the source of supply by representatives of the Division of Highways. The quantities shown do not include rejected materials.

Account	Quantity
State Bond Issue	27,507,604 lbs.
County—15d	9,720,875 lbs.
Straight, County and Township	2,092,935 lbs.
Purchases and Construction	22,093 lbs.
Other States	15,102,252 lbs.
Total	54,445,759 lbs.

Approximately seventy-five per cent of the above material originated from plants located in the Chicago industrial district, twenty per cent in the St. Louis industrial district and five per cent at other locations which include Moline, Illinois, and Cincinnati, Ohio.

Certain laboratory facilities are essential for the conduct of steel inspection and tests. A branch steel laboratory centrally located with respect to the proper steel plants is maintained in the Chicago district. In St. Louis the testing facilities of two of the larger steel companies are utilized.

The inspection of reinforcement steel embraces the sampling and testing of the steel at the mill or warehouse before it is fabricated and the supervision of the cutting, bending and loading. Poorly rolled, undersized or otherwise defective bars and materials failing to pass the laboratory tests are immediately rejected. All approved material is tagged so that it can be identified as having been tested at the mill and passed by an authorized State representative.

4. RESEARCH AND INVESTIGATIONS.—Several investigations already in progress were continued during 1929, and in addition other new projects dealing with pavement design, highway materials, testing and inspecting, the quality of concrete and highway construction were carried on. Summary reports of these branches follow:

a. Highway Materials:

(1) Effect of Ferrous Sulphide in Cement.—It is recognized by those familiar with investigations of cement which have been conducted in the past few years that sulphur in the form of ferrous sulphide when present in sufficient quantities is detrimental to the strength of cement. During the latter part of 1928 samples of one brand of cement revealed the presence of about 0.10 per cent of ferrous sulphide. Test specimens made with this cement also showed the characteristic green discoloration of sulphide cement.

In view of the fact that previous tests conducted by the Department showed that the cement being tested, and which contained ferrous sulphide, lost strength rapidly after ninety days, it was decided to secure a sufficient quantity of the questionable cement and make a sufficient number of tests over the period of a year to see if the sulphide present does affect the strength. The cement as used was divided into three groups containing a high, medium and low sulphide content.

The specimens made consisted of 6″x6″x30″ concrete beams; 6″x12″ concrete cylinders; briquettes and 2″x4″ mortar cylinders sieved out of concrete; neat cement briquettes; 1:3 standard briquettes and 2″x4″ standard cylinders. Two sets of specimens were made, one stored in air and the other in water. In addition to the above a few miscellaneous tests, such as normal consistency, setting time, and heat generated, were also made. Tests are being made at 3, 7, 14, 21, 60, 90, 180 and 360 days. The investigation will be completed on March 1, 1930.

(2) Chert Investigation.—This investigation of indefinite duration was started during the summer of 1929 to determine the water resisting qualities of concrete containing various percentages of chert used as a coarse aggregate. The material used was obtained from two sources. A total of twenty 30″x36″x6″ concrete slabs and twenty 6″x6″x30″ concrete beams were made. Ten slabs and ten beams were made with material from each source.

The following percentages—0, 1, 2, 3, 5, 10, 12½, 25, 50 and 100 per cent of chert were used in making the specimens. After curing for ten days all specimens were placed outside the laboratory to be exposed to the weather for an indefinite period of time.

(3) Durability of Paint for Steel Structures.—Investigation of the durability of paint for steel structures mentioned in the 1928 Annual Report was continued in 1929. The tests were started in April, 1926, and are now beginning to show failures. Check tests, however, were started in October, 1929, to confirm some of the failures which have occurred. This investigation will be continued until a failure occurs in all of the tests.

(4) The Effect of Zinc Chloride on White Lead Paint.—This investigation, which was started in December, 1926, for the purpose of determining whether zinc chloride when applied as a wood preservative will discolor white lead paint applied directly over the preservative coating, will be continued until definite conclusions may be drawn. It will probably be necessary to repaint some of the specimens during the coming year.

b. Quality of Concrete.

(1) Tests of Concrete Bridge Cylinders.—The work of making and testing concrete cylinders to obtain accurate data concerning the strength of the concrete with which our bridges are constructed was continued throughout the year 1929, during which time 1,282 cylinders were tested to determine the compressive strength, absorption and weight per cubic foot. The sources from which these cylinders were received are shown in Table 32. The data that are now being collected will be compiled for the use of the Bridge and Construction Departments.

TABLE 32—NUMBER OF CONCRETE CYLINDERS RECEIVED FOR TESTS.

District.	Bridge cylinders.	Pile cylinders.
1	57	
2	151	
3	313	
4	77	
5	114	
6	158	
7	48	108
8	102	113
9	41	
Total	1,061	221
Grand total		1,282

(2) Tests of Concrete Pavement Cores.—During the year 1929, 13,747 cores drilled from concrete pavements throughout the State were tested in the laboratory to determine the compressive strength, absorption and weight per cubic foot. This represents an increase of 115 per cent over the work done in 1928. One-half of the total number of cores are tested in compression, the other half being stored at the laboratory for future reference. The division of these cores, according to type and source, is shown in Table 33.

The strength results of cores tested in 1928 were tabulated and plotted into curves with reference to the age of the concrete, during the calendar year 1929. This work revealed some interesting comparisons between the quality of the concrete in the pavements of the various highway districts to that of the State as a whole.

TABLE 33—NUMBER AND KIND OF CONCRETE ROAD CORES TESTED DURING 1929.

District.	Regular cores.		*Special cores.		Blow-up cores.		City cores.	
	Number tested.	Number broken.	Number tested.	Number broken.	Number tested.	Number broken.	Number tested.	Number broken.
1	2,721	1,377	6	6			107	63
2	1,388	699	44	44				
3	1,838	961	324	275	292	288		
4	2,071	1,044	111	61				
5	1,031	524	39	39				
6	642	316	128	90	321	321	14	9
7	661	332	10	10				
8	923	458	137	79				
9	870	435	41	37			28	17
Total	12,145	6,146	840	641	613	609	149	89

Total cores tested, 13,747.
Total cores broken, 7,485.
* Scaling, disintegration, hair checking, etc.

(3) Beam Curing Investigation.—During the construction season of 1928 and 1929 concrete beams were made in the field to determine the flexural strength of similar concrete placed in the pavements. Before the 1929 construction season was well under way it was disclosed that the test beams were being cured by several different methods instead of them all being cured alike. It was, therefore, decided to conduct an investigation to determine to what extent the different methods of curing affected the strength of the concrete.

This work was done at the laboratory. One hundred twenty 6″x6″x30″ concrete beams were made and cured by ten different carefully controlled methods and tested for their flexural strength at the ages of 5, 7, 10, 14, 21 and 28 days. This investigation has been completed and the results are available.

(4) Concrete Waterproofing.—This investigation was started in January, 1929, to determine the comparative waterproofing qualities of four commercial waterproofing products. Four different methods of exposure are being used with each product. The specimens used are 6″ concrete cubes. These were treated with the waterproofing compounds and stored as follows: In the air under the eaves of the laboratory, buried in earth, and submerged in water. Plain cubes are also being observed for absorption along with the waterproofing specimens. This investigation will be continued for one year and possibly longer.

(5) Segregation of Materials in a Concrete Mix.—In a previous investigation made to determine the advisability of using a special wire mesh covered with fine wire screen to replace the usual wide forms used in constructing concrete bridge floors and similar structures, it was observed that the variation in the strength of cores drilled from a slab having a 1-inch slump was approximately three times greater than the

variation in the strength of cores drilled from a slab whose slump was 7 or 8 inches. The cause of these differences in variation was not known.

As a result of those observations another investigation, limited in scope, was undertaken to determine the cause of such variations and the reason for the non-uniform distribution of the coarse aggregate after the concrete is mixed and placed. The work consisted in making four 30″x30″x6″ slabs of concrete whose slumps were approximately 1, 2, 4, and 8 inches and two mortar slabs of the same size, one containing 15 per cent water by weight of cement and sand and the other 22 per cent by weight of cement and sand. This resulted in mortars similar to those in the concrete having slumps of 2 inches and 8 inches respectively. Three 6″x12″ cylinders were also made along with each of the concrete slabs. Cores were drilled from the slabs and tested in compression. The absorption, specific gravity and weight per cubic foot were also obtained. Samples of concrete secured before it had set. These were washed and a screen analysis made of the coarse aggregate.

The results of this investigation are on file and available for those interested.

c. *Highway Construction.*

(1) Jacksonville Experimental Road.—Assistance was given to the County of Sangamon in planning and conducting an investigation on wearing surfaces for oiled roads on the old Jacksonville road west of Springfield. This road is subjected to a severe test during the present winter and should reveal some interesting data in the spring of 1930.

5. PREPARATION OF REPORTS AND BULLETINS.—Reports of all research and investigations carried on by the Bureau of Materials were prepared and the following technical bulletins were issued during 1929 for the use of the Bureaus and the districts:

a. Painting Wood and Steel.
b. Silk Screen Stencil Process for Highway Markers and signs.
c. Instructions for Making and Storing Concrete Test Cylinders.
d. Alfalfa for Roadside Planting.

Reports were also made up which covered the following subjects:

a. Scale of License Fees.—During the spring of 1929 a study of the scale of license fees was made which revealed an inconsistent relation between fees paid for trucks and trailers. This resulted in legislation which fixed the fees for trucks on a more equitable basis.

b. Steel Reinforcement.—A study of available data on the use of steel reinforcement, and particularly wire mesh reinforcement.

6. SPECIFICATIONS.—The standard specifications for road and bridge construction have been revised to conform to the latest developments in engineering practice and are now being arranged in a convenient form for the final approval of the administrative officers of the Department. A number of specifications for special materials used by the Bureau of Maintenance were also prepared. These specifications should be ready for the printer early in 1930.

7. DEPARTMENTAL SERVICE.—The following departmental services were rendered by this Bureau:

a. Photographic.—The photographic section secured records of road and bridge construction and made reproductions of maps, reports and other data for the Bureaus and districts where the use of photographs was considered advisable. Many of these records have been used in legal cases where exact duplicates of the original are necessary. An index of the films on file and some books containing pictures of construction scenes from the various districts have been prepared to facilitate ordering prints. Table 34 shows the number of films and prints prepared for the various Bureaus.

TABLE 34—NUMBER OF FILMS AND PRINTS PREPARED FOR THE VARIOUS BUREAUS DURING 1929.

Account.	Films.	Prints.
Highway Executive Office	2	51
Bureau of Audits	36	85
Bureau of Construction	26	409
Bureau of Design	15	493
Bureau of Maintenance	87	358
Bureau of Materials	187	1,631
District No. 1	61	61
District No. 2	43	66
District No. 3	27	27
District No. 4	54	54
District No. 5	41	41
District No. 6	55	836
District No. 7	50	0
District No. 8	50	0
District No. 9	36	0
Total	770	4,112

b. Mechanical Service.—Some of the services rendered by this section were:

(1) The calibrating and repairing of portable scales or wheel load weighers used by the highway patrol officers.

(2) The construction and repairing of office furniture and fixtures.

(3) The construction of mechanical apparatus used in the highway research and investigations.

(4) The construction and repair of various other kinds of equipment.

c. Paint for Construction and Maintenance.—This Bureau inspects, stores and distributes all the paint used in the construction and maintenance of highways and bridges in Illinois. Table 35 shows the quantity of paint distributed during the calendar year 1929.

TABLE 35—PAINT HANDLED BY BUREAU OF MATERIALS DURING THE CALENDAR YEAR 1929.

Inventory.		Inventory, gallons.
On hand January 1, 1929—		
Blue lead paint	5,695½ Gals.	
White lead paint	5,965 Gals.	
Red enamel	10 Gals.	
Total		11,670½
Received during year, 1929—		
Blue lead paint	10,270 Gals.	
White lead paint	13,165 Gals.	
Total		23,435
		35,105½

Distribution.	Paint furnished—gallons.			Inventory, gallons.
	Blue lead paint.	White lead paint.	Red enamel.	
Lost in transit—claim filed with railway company	27	63		
Furnished free to contractors in accordance with terms of contracts—				
District No. 1	879	700		
District No. 2	830½	335½		
District No. 3	2,174½	2,241½		
District No. 4	2,071	1,614½		
District No. 5	430	82		
District No. 6	716	1,109		
District No. 7	364½	403½		
District No. 8	516½	643½		
District No. 9	365½	483½		
Charged to contractors account used in excess of maximum amount allowed by contract	365½	125		
Furnished for miscellaneous State work, paint paid for by contractor	8	43		
Furnished for county work, paint paid for by county or contractor—				
State Aid—15d	1,485	165		
County and township	284	405		
Division of Highways, General Administration		1		
Bureau of Construction, Day Labor	520	775		
Bureau of Maintenance—				
General		½		
District No. 1		645	4	
District No. 2	10	620		
District No. 3	75	830		
District No. 4	30	370		
District No. 5	10	1,520		
District No. 6	60	933		
District No. 7		300	1	
District No. 8	12	700		
District No. 9		600		
Bureau of Materials	16½	40		
Total	11,250½	15,748½	5	
Less paint furnished during 1929				27,004
On hand January 1, 1930—				
Blue lead paint 4,715 Gals.				
White lead paint 3,381½ Gals.				
Red enamel 5 Gals.				
Balance				8,101½

V. BUREAU OF MAINTENANCE.

1. DUTIES. The Bureau of Maintenance is responsible for the following:

a. The maintenance of all surfaced roads, detours, unpaved and temporary routes, the right-of-way State roads, culverts, stream channels and large bridges.

b. State owned equipment used by the Bureau of Maintenance.

c. The construction of additions and betterments.

d. The placing and maintenance of route markers and safety signs.

e. The issuing of permits and franchises.

f. The publication of a State route bulletin.

g. The reporting, recording and tabulation of accidents occurring on the State highways.

h. The operation of the highway police organization.

All activities are performed through the district maintenance organizations in their respective districts and they report to the engineer of maintenance all matters concerning this work. Detailed reports of these activities for 1929 will be found in the following paragraphs.

2. MAINTENANCE OF SURFACED ROADS. *a.—Activities during 1929.* During the calendar year 1929, the Bureau of Maintenance maintained 7,772.80 miles of surfaced roads, the mileage of the various types being shown in Figure 51 and the following tabulation:

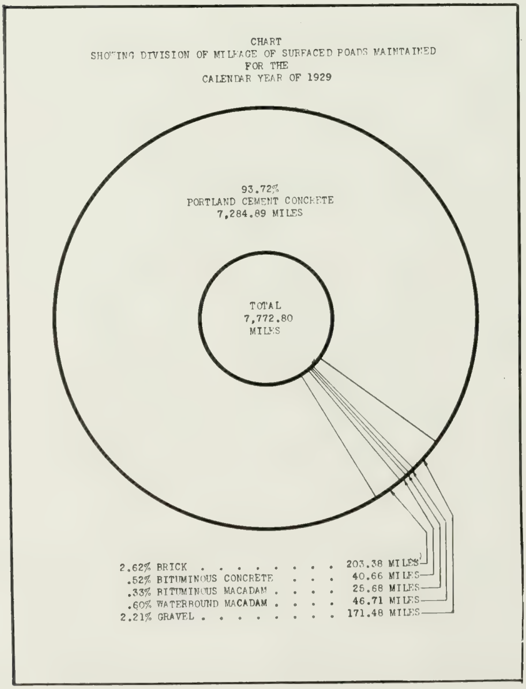


Figure 51.

Type	Miles	Per cent
Portland cement concrete	7,284.89	93.72
Bituminous concrete	40.66	.52
Brick	203.38	2.62
Bituminous macadam	25.68	.33
Water bound macadam	46.71	.60
Gravel	171.48	2.21
Total	7,772.80	100.00

b. Maintenance Organization.—The maintenance of surfaced roads is arranged by types as shown above and divided into patrols. The patrols are grouped as maintenance sections averaging about twenty miles in length, which is a convenient length for one patrolman to maintain.

A supervising patrolman is assigned in charge of about six to eight maintenance sections. He is responsible to the district maintenance engineer. The supervisor must approve the employment of laborers to assist the maintenance patrolman in the performance of his duties and the district engineer's approval is also needed when an unusual amount of help is required.

The district maintenance engineer, who is in charge of all maintenance work in the district is responsible to the district engineer who in turn reports to the Engineer of Maintenance.

The division of the various types of surfaced roads into patrols is shown in Table 36.

c. Maintenance Equipment.—The equipment furnished to each patrolman consists of a truck, tar kettle, road grader, road drags and such other small tools as may be necessary for the repairing or replacement of damaged wearing surfaces. Each patrolman is held responsible for the keeping of his equipment in serviceable condition and is required to make periodical reports of same to his supervising patrolman. In each district other equipment is available for the patrolman, such as concrete mixers, tractors, traffic line markers, mowing machines, snow plows, etc., for the maintaining of his patrol.

d. Maintenance Methods.—The narrow cracks and breaks which occur in concrete pavements are generally repaired with asphalt, sand and gravel. Depressions or surface settlements are built up to a uniform grade with asphalt, gravel, stone or chips. The portions of the wearing surface damaged beyond repair are replaced with new construction. The ruts and eroded places in the earth shoulders are filled with earth and dragged smooth. In the case of some of the heavier traveled roads where excessive ruts have developed, gravel, shale or crushed stone is placed along the edge of the pavement. Weeds are cut and the shoulders mowed during the summer and fall. Ditches and culverts are cleaned systematically to provide the necessary drainage. The right of way is cleaned and cleared of objectionable growths, such as bushes and limbs of trees. The maintenance of surfaced roads also includes repairing and replacing of route markers and safety signs; painting of the traffic line; repairing, repainting and replacing guard fence; repairing, cleaning and repainting bridges, removal of snow and the filling of expansion joints with asphalt.

TABLE 36—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF SURFACED ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1929 IN ALL DISTRICTS.

District.	Portland cement concrete.		Brick.		Bituminous concrete.		Bituminous macadam.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1	216	1,426.98	3	1.52	14	40.66	2	9.15
No. 2	79	695.09	7	23.03	---------	---------	4	7.44
No. 3	134	1,128.23	9	8.39	---------	---------	2	1.79
No. 4	122	857.87	11	44.48	---------	---------	---------	---------
No. 5	104	926.22	28	77.48	---------	---------	---------	---------
No. 6	78	641.69	9	12.41	---------	---------	2	2.53
No. 7	71	583.37	4	9.20	---------	---------	---------	---------
No. 8	94	568.63	5	16.88	---------	---------	1	2.07
No. 9	69	456.81	4	9.99	---------	---------	2	2.70
Total	967	7,284.89	80	203.38	14	40.66	13	25.68

TABLE 36—Concluded.

District.	Waterbound macadam.		Gravel.		Patrols consisting of bridges—100 ft. span or over.	Total.	
	Patrols.	Miles.	Patrols.	Miles.		Patrols.	Miles.
No. 1	9	27.69	3	4.61	67	314	1,510.61
No. 2	2	3.19	13	65.92	41	146	794.67
No. 3	1	2.00	10	40.65	36	192	1,181.06
No. 4	---------	---------	3	2.36	36	172	904.71
No. 5	---------	---------	5	13.97	26	163	1,017.67
No. 6	2	7.25	---------	---------	23	114	663.88
No. 7	1	1.93	6	8.95	11	93	603.45
No. 8	3	4.65	3	5.18	25	131	597.41
No. 9	---------	---------	6	29.84	36	117	499.34
Total	18	46.71	49	171.48	301	1,442	7,772.80

e. Patrol Marking System.—A patrol marking system which is in use enables the Bureau to collect cost data not only according to districts, but also by the different types of roads and the period of construction. The method is a numerical system, the first figure of the patrol number indicates the district in which the patrol is located, the second figure indicates the type of road and the remaining figure indicates the number of the patrol of that type in that district. The patrols are arranged to number so that the oldest pavement is numbered first with the various years of construction of such types following each other in numerical sequence.

f. Maintenance Costs.—(1) For Total Mileage of Surfaced Roads Maintained. Cost data for the various items of work necessary for the maintenance of the various types of surfaced roads during 1929 are shown in Table 37. These data are reduced to a per mile basis in Table 38. Figure 52 shows the division of cost of maintenance on the total mileage of surfaced roads for 1929 and Figure 53 shows the division of this cost by cost components.

TABLE 37—STATEMENT SHOWING COMPARISON OF MILES AND COST OF VARIOUS TYPES MAINTAINED DURING THE CALENDAR YEAR OF 1929.

	Portland cement concrete.	Brick.	Bituminous concrete.
Miles maintained	7,284.89	203.38	40.66
Maintenance of Wearing Surface—			
Paved surface	$507,439.98	$46,150.32	$36,629.66
Upkeep of Roadside—			
Metal shoulders	$ 10,477.66	$ 846.60	
Earth shoulders	499,629.54	18,066.67	$1,391.78
Ditches and drains	238,257.79	7,326.30	925.34
Bridges and culverts	99,323.16	1,160.21	32.01
Markers and safety signs	90,842.37	1,708.65	475.04
Guard fence	55,138.58	1,716.16	161.36
Cutting and clearing vegetation	382,567.38	10,347.22	2,358.92
Cleaning right of way	67,427.69	1,767.58	369.72
Snow removal	222,427.88	5,225.58	1,200.03
Total upkeep	$1,666,092.05	$48,164.97	$6,914.20
Total maintenance and upkeep cost	$2,173,532.03	$94,315.29	$43,543.86

TABLE 37—Concluded.

	Bituminous macadam.	Waterbound macadam.	Gravel.	Total.
Miles maintained	25.68	46.71	171.48	7,772.80
Maintenance of Wearing Surface—				
Paved surface	$3,541.20	$17,468.10	$46,515.65	$657,744.91
Upkeep of Roadside—				
Metal shoulders				$ 11,324.26
Earth shoulders	$1,187.28	$1,504.50	$1,277.28	523,057.05
Ditches and drains	512.20	1,897.75	3,562.37	252,481.75
Bridges and culverts	29.25	70.10	569.16	101,183.89
Markers and safety signs	33.01	4.38	19.66	93,083.11
Guard fence	27.45		16.29	57,059.84
Cutting and clearing vegetation	1,095.68	1,562.76	5,219.03	403,150.99
Cleaning right of way	122.19	7.11	281.18	69,975.47
Snow removal	591.61	425.04	1,535.25	231,405.39
Total upkeep	$3,598.67	$5,471.64	$12,480.22	$1,742,721.75
Total maintenance and upkeep cost	$7,139.87	$22,939.74	$58,995.87	$2,400,466.66

TABLE 38—STATEMENT SHOWING COMPARISON OF MILEAGES AND COSTS ON PER MILE BASIS BY TYPES AND UNITS FOR THE CALENDAR YEAR 1929.

	Portland cement concrete.	Brick.	Bituminous concrete.
Miles maintained	7,284.89	203.38	40.66
Maintenance of Wearing Surface—			
Paved surface	69.66	226.92	900.88
Upkeep of Roadside—			
Metal shoulders	1.44	4.16	------------
Earth shoulders	68.59	88.84	34.23
Ditches and drains	32.70	36.02	22.76
Bridges and culverts	13.63	5.70	.79
Markers and safety signs	12.47	8.40	11.68
Guard fence	7.57	8.44	3.97
Cutting and clearing vegetation	52.51	50.88	58.02
Cleaning right of way	9.26	8.69	9.09
Snow removal	30.53	25.69	29.51
Total upkeep	228.70	236.82	170.05
Total maintenance and upkeep	298.36	463.74	1,070.93

TABLE 38—Concluded.

	Bituminous macadam.	Waterbound macadam.	Gravel.
Miles maintained	25.68	46.71	171.48
Maintenance of Wearing Surface—			
Paved surface	$137.90	$373.97	$271.26
Upkeep of Roadside—			
Metal shoulders	------------	------------	------------
Earth shoulders	$46.23	$32.21	$ 7.45
Ditches and drains	19.95	40.63	20.77
Bridges and culverts	1.14	1.50	3.32
Markers and safety signs	1.29	.09	.11
Guard fence	1.07	------------	.10
Cutting and clearing vegetation	42.66	33.46	30.44
Cleaning right of way	4.76	.15	1.64
Snow removal	23.04	9.10	8.95
Total upkeep	$140.14	$117.14	$72.78
Total maintenance and upkeep	$278.04	$491.11	$344.04

NOTE.—The costs per mile shown under bituminous macadam, waterbound macadam, and gravel do not represent a fair average cost for maintenance and upkeep of such types due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

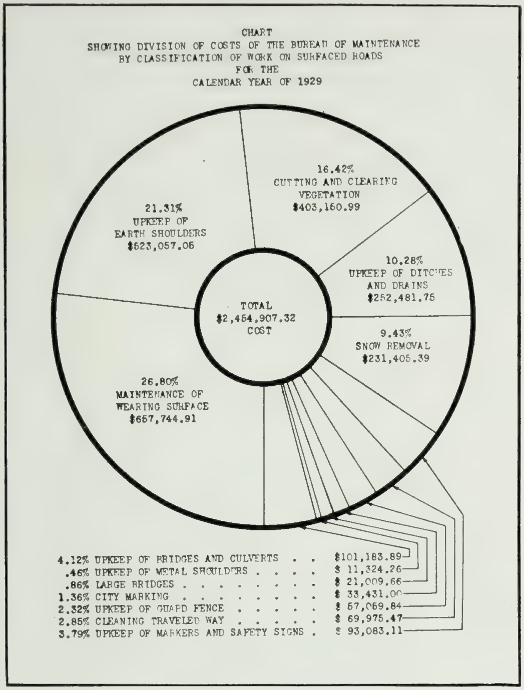


Figure 52.

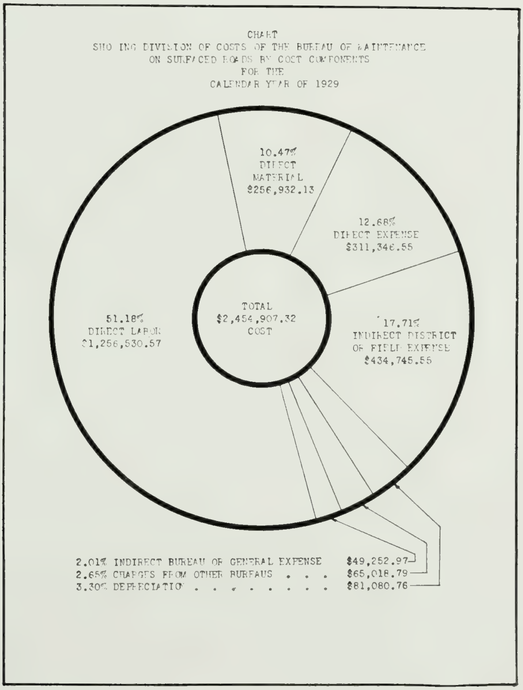


Figure 53.

(2) Portland Cement Concrete Roads.—The cost data for the portland cement concrete roads given in Table 37 is shown in Figure 54, and the division of the cost of maintenance for this type of road is given by cost components in Table 39.

(3) Brick Roads.—The cost data for brick roads given in Table 37 is shown in Figure 55 and the division of the cost of maintenance for this type of road is given by cost components in Table 40.

(4) Bituminous Concrete Roads.—The cost data for bituminous concrete roads is given in Table 37 and the cost of maintenance for this type of road is given by cost components in Table 41.

(5) Bituminous Macadam Roads.—The cost data for bituminous macadam roads is given in Table 37 and the division of costs of maintenance for this type of road is given by cost components in Table 42.

(6) Water-bound Macadam Roads.—The cost data for water-bound macadam roads is given in Table 37 and the division of costs of maintenance for this type of road is given in Table 43.

(7) Gravel Roads.—The cost data for gravel roads is given in Table 37 and the division of the cost of maintenance for this type of road is given in Table 44.

3. MAINTENANCE OF DETOURS, UNPAVED AND TEMPORARY ROUTES. *a. Activities during 1929.*—The Bureau of Maintenance maintained 355.20 miles of detours, unpaved and temporary routes during the calendar year 1929, the mileage of the various types being as shown in Figure 56 and the following tabulation:

Type	Miles	Per cent
Earth	210.18	59.17
Gravel	121.26	34.14
Cinders	7.12	2.01
Macadam	8.15	2.29
Shale	.86	.24
Miscellaneous	7.63	2.15
Total	355.20	100.00

b. Maintenance Organization.—An organization for the maintaining of detours, unpaved and temporary routes are divided into patrols similar to that used for the maintenance of surfaced roads. The patrolmen are employed on an hourly or monthly basis depending upon the amount and kind of work required and the traffic conditions encountered. The division of the various types into patrols is shown in Table 45.

c. Maintenance Equipment.—Each patrolman employed for this type of work is required to furnish a team. A light road grader, drags and other necessary equipment are furnished by the Bureau.

d. Maintenance Methods.—The maintenance of detours, unpaved and temporary routes consists of grading the wearing surface and in cases of heavy traffic these roads are surfaced with gravel. The gaps in the pavement which were omitted due to excessive fills or other causes are surfaced with gravel or macadam. All detours and temporary routes are marked with route markers and safety signs at convenient points for the convenience and safety of the traveling public. Culverts and ditches are cleaned to provide the necessary drainage. Weeds and vegetation growth are cleared from the right-of-way.

e. Maintenance Costs.—The expenditure for the maintenance of detours, unpaved and temporary routes are only such as to care for the

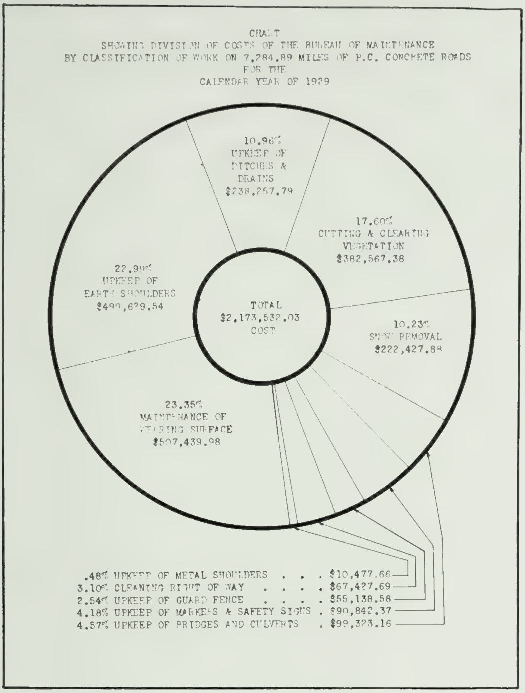


Figure 54.

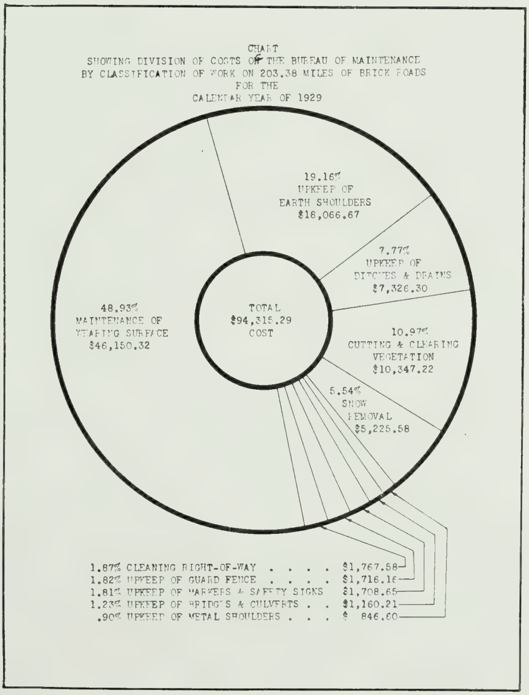


Figure 55.

TABLE 39—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 7,284.89 MILES OF CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense
Maintenance of wearing surface—				
Paved surface	431,559	$207,726.23	$136,325.82	$52,983.29
Upkeep of Roadside—				
Metal shoulders	8,843	$ 4,527.55	$ 1,880.72	$ 1,639.66
Earth shoulders	574,353¼	276,469.02	14,323.78	68,368.50
Ditches and drains	284,495¼	135,769.99	5,076.25	28,854.21
Bridges and culverts	95,503	52,298.10	11,010.83	10,230.54
Markers and safety signs	79,625	41,630.10	16,934.23	11,397.85
Guard fence	46,063	21,886.42	15,932.50	5,339.83
Cutting and clearing vegetation	436,753½	234,991.23	----------------	36,711.34
Cleaning right-of-way	71,942	36,515.15	----------------	12,189.58
Snow removal	216,476	114,670.67	----------------	51,692.96
Total upkeep	1,814,054	$918,758.23	$65,158.31	$226,424.47
Total maintenance and upkeep costs	2,245,613	$1,126,484.46	$201,484.13	$279,407.76

TABLE 39—Concluded.

Account.	Total direct cost.	Indirect expense*.	Total cost.	Average cost per mile.
Maintenance of Wearing surface—				
Paved surface	$397,035.34	$110,404.64	$507,439.98	$69.66
Upkeep of Roadside—				
Metal shoulders	$ 8,047.93	$ 2,429.73	$ 10,477.66	$ 1.44
Earth shoulders	359,161.30	140,468.24	499,629.54	68.59
Ditches and drains	169,700.45	68,557.34	238,257.79	32.70
Bridges and culverts	73,539.47	25,783.69	99,323.16	13.63
Markers and safety signs	69,962.18	20,880.19	90,842.37	12.47
Guard fence	43,158.75	11,979.83	55,138.58	7.57
Cutting and clearing vegetation	271,702.57	110,864.81	382,567.38	52.51
Cleaning right-of-way	48,704.73	18,722.96	67,427.69	9.26
Snow removal	166,363.63	56,064.25	222,427.88	30.53
Total upkeep	$1,210,341.01	$455,751.04	$1,666,092.05	$228.70
Total maintenance and upkeep costs	$1,607,376.35	$566,155.68	$2,173,532.03	$298.36

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE 40—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 203.38 MILES OF BRICK ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of Wearing Surface—				
Paved surface	40,510¼	$17,276.66	$15,055.80	$5,318.03
Upkeep of Roadside—				
Metal shoulders	734	$ 367.51	$134.18	$ 141.99
Earth shoulders	20,848½	9,902.30	400.74	2,795.22
Ditches and drains	8,652½	4,000.46	275.86	986.62
Bridges and culverts	1,206	609.66	72.90	165.07
Markers and safety signs	1,709	816.12	217.96	257.62
Guard fence	1,315½	618.78	587.87	174.22
Cutting and clearing vegetation	12,050	6,193.21		1,144.46
Cleaning right-of-way	1,962	962.01		290.72
Snow removal	5,151	2,533.77		1,476.98
Total upkeep	53,628½	$26,003.82	$1,689.51	$7,432.90
Total maintenance and upkeep costs	94,138¾	$43,280.48	$16,745.31	$12,750.93

TABLE 40—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—				
Paved surface	$37,650.49	$8,499.83	$46,150.32	$226.92
Upkeep of Roadside—				
Metal shoulders	$ 643.68	$ 202.92	$ 846.60	$ 4.16
Earth shoulders	13,098.26	4,968.41	18,066.67	88.84
Ditches and drains	5,262.94	2,063.36	7,326.30	36.02
Bridges and culverts	847.63	312.58	1,160.21	5.70
Markers and safety signs	1,291.70	416.95	1,708.65	8.40
Guard fence	1,380.87	335.29	1,716.16	8.44
Cutting and clearing vegetation	7,337.67	3,009.55	10,347.22	50.88
Cleaning right-of-way	1,252.73	514.85	1,767.58	8.69
Snow removal	4,010.75	1,214.83	5,225.58	25.69
Total upkeep	$35,126.23	$13,038.74	$48,164.97	$236.82
Total maintenance and upkeep costs	$72,776.72	$21,538.57	$94,315.29	$463.74

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE 41—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 40.66 MILES OF BITUMINOUS CONCRETE ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of Wearing Surface—				
Paved surface	25,359	$15,156.80	$10,483.37	$3,637.62
Upkeep of Roadside—				
Metal shoulders				
Earth shoulders	1,203	$ 672.29	$232.20	$138.53
Ditches and drains	1,032	569.36		56.79
Bridges and culverts	37	19.45		1.83
Markers and safety signs	486	272.02	17.58	44.54
Guard fence	178	96.35	5.16	8.25
Cutting and clearing vegetation	2,462	1,574.10		71.06
Cleaning right of way	368	198.92		64.11
Snow removal	1,103	683.82		196.44
Total upkeep	6,869	$4,086.31	$254.94	$581.55
Total maintenance and upkeep costs	32,228	$19,243.11	$10,738.31	$4,219.17

TABLE 41—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—				
Paved surface	$29,277.79	$7,351.87	$36,629.66	$900.88
Upkeep of Roadside—				
Metal shoulders				
Earth shoulders	$1,043.02	$348.76	$1,391.78	$34.23
Ditches and drains	626.15	299.19	925.34	22.76
Bridges and culverts	21.28	10.73	32.01	.79
Markers and safety signs	334.14	140.90	475.04	11.68
Guard fence	109.76	51.60	161.36	3.97
Cutting and clearing vegetation	1,645.16	713.76	2,358.92	58.02
Cleaning right of way	263.03	106.69	369.72	9.09
Snow removal	880.26	319.77	1,200.03	29.51
Total upkeep	$4,922.80	$1,991.40	$6,914.20	$170.05
Total maintenance and upkeep costs	$34,200.59	$9,343.27	$43,543.86	$1,070.93

* Includes gas, oil, grease, repairs and parts for trucks, depreciation of equipment, and office overhead for both central and district offices.

TABLE 42—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 25.68 MILES OF BITUMINOUS MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of Wearing surface—				
Paved surface	3,134½	$1,588.18	$696.82	$373.60
Upkeep of Roadside—				
Metal shoulders				
Earth shoulders	1,263	$644.52	$101.13	$108.65
Ditches and drains	567	273.31	7.20	71.26
Bridges and culverts	36	18.19		.98
Markers and safety signs	35	18.88		4.21
Guard fence	36	16.64	2.56	.40
Cutting and clearing vegetation	1,265	674.22		71.94
Cleaning right-of-way	152	73.60		6.73
Snow removal	567	314.37		115.97
Total upkeep	3,921	$2,033.73	$110.89	$380.14
Total maintenance and upkeep costs	7,055½	$3,621.91	$807.71	$753.74

TABLE 42—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of wearing surface—				
Paved surface	$2,658.60	$882.60	$3,541.20	$137.90
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	$854.30	$332.98	$1,187.28	$46.23
Ditches and drains	351.77	160.43	512.20	19.95
Bridges and culverts	19.17	10.08	29.25	1.14
Markers and safety signs	23.09	9.92	33.01	1.29
Guard fence	19.60	7.85	27.45	1.07
Cutting and clearing vegetation	746.16	349.52	1,095.68	42.66
Cleaning right-of-way	80.33	41.86	122.19	4.76
Snow removal	430.34	161.27	591.61	23.04
Total upkeep	$2,524.76	$1,073.91	$3,598.67	$140.14
Total maintenance and upkeep costs	$5,183.36	$1,956.51	$7,139.87	$278.04

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under bituminous macadam do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE 43—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 46.71 MILES OF WATERBOUND MACADAM ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of Wearing Surface—				
Paved surface	12,289	$7,726.50	$5,258.33	$1,097.95
Upkeep of Roadside—				
Metal shoulders				
Earth shoulders	1,600	$ 858.63		$182.56
Ditches and drains	2,016	1,192.64	$6.40	120.12
Bridges and culverts	70	34.68		14.99
Markers and safety signs	4	2.00		1.19
Guard fence				
Cutting and clearing vegetation	1,806½	996.19		54.41
Cleaning right-of-way	9	4.50		
Snow removal	386	226.69		86.60
Total upkeep	5,891½	$3,315.33	$6.40	$459.87
Total maintenance and upkeep costs	18,180½	$11,041.83	$5,264.73	$1,557.82

TABLE 43—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—				
Paved surface	$14,082.78	$3,385.32	$17,468.10	$373.97
Upkeep of roadside—				
Metal shoulders				
Earth shoulders	$1,041.19	$463.31	$1,504.50	$32.21
Ditches and drains	1,319.16	578.59	1,897.75	40.63
Bridges and culverts	49.67	20.43	70.10	1.50
Markers and safety signs	3.19	1.19	4.38	.09
Guard fence				
Cutting and clearing vegetation	1,050.60	512.16	1,562.76	33.46
Cleaning right-of-way	4.50	2.61	7.11	.15
Snow removal	313.29	111.75	425.04	9.10
Total upkeep	$3,781.60	$1,690.04	$5,471.64	$117.14
Total maintenance and upkeep costs	$17,864.38	$5,075.36	$22,939.74	$491.11

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE 44—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF 171.48 MILES OF GRAVEL ROADS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of Wearing Surface—				
Paved surface	88,945	$15,296.44	$18,073.28	$5,515.29
Upkeep of Roadside—				
Metal shoulders				
Earth shoulders	1 349	$ 681.08	$ 3.30	$211.81
Ditches and drains	3,692½	1,817.56	23.31	749.50
Bridges and culverts	570½	262.40	13.44	134.74
Markers and safety signs	22	12.04		1.16
Guard fence	18	9.31		2.10
Cutting and clearing vegetation	5,643½	2,907.52		774.94
Cleaning right-of-way	209½	113.18		107.98
Snow removal	1,407	829.97		316.21
Total upkeep	12,912	$6,633.06	$40.05	$2,298.44
Total maintenance and upkeep costs	101,857	$21,929.50	$18,113.33	$7,813.73

TABLE 44—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—				
Paved surface	$38,885.01	$7.630.64	$46.515.65	$271.26
Upkeep of Roadside—				
Metal shoulders				
Earth shoulders	$ 896.19	$ 381.09	$1,277.28	$ 7.45
Ditches and drains	2,590.37	972.00	3,562.37	20.77
Bridges and culverts	410.58	158.58	569.16	3.32
Markers and safety signs	13.20	6.46	19.66	.11
Guard fence	11.41	4.88	16.29	.10
Cutting and clearing vegetation	3,682.46	1,536.57	5,219.03	30.44
Cleaning right-of-way	221.16	60.02	281.18	1.64
Snow removal	1,146.18	389.07	1,535.25	8.95
Total upkeep	$8,971.55	$3,508.67	$12,480.22	$72.78
Total maintenance and upkeep costs	$47,856.56	$11,139.31	$58,995.87	$344.04

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

The costs per mile shown under gravel do not represent a fair average cost for maintenance and upkeep of such type due to the fact that they are located on State Aid roads where the traffic is light and only a sufficient amount of maintenance is expended to keep them in passable condition.

TABLE 45—CONSOLIDATED STATEMENT SHOWING THE NUMBER OF PATROLS AND MILES OF VARIOUS TYPES OF DETOUR ROADS MAINTAINED ON A CALENDAR YEAR BASIS FOR 1929 IN ALL DISTRICTS.

District.	Earth.		Gravel.		Cinders.		Shale.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1	3	3.95	29	20.12				
No. 2	13	34.58	26	7.96				
No. 3	2	21.34	16	23.69				
No. 4	8	23.93	50	25.17	4	1.20		
No. 5			10	2.75				
No. 6	6	45.59	15	7.72	3	.28	2	.86
No. 7	12	52.71	21	12.03	2	1.40		
No. 8	8	8.12	21	3.79	8	1.91		
No. 9	12	19.96	27	18.03	6	2.33		
Total	64	210.18	215	121.26	23	7.12	2	.86

TABLE 45—Concluded.

District.	Macadam.		Route marking.		Miscellaneous.		Total.	
	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.	Patrols.	Miles.
No. 1	8	5.20	25	128.88	2	6.91	67	165.06
No. 2							39	42.54
No. 3	5	1.94	13	88.09	4	.72	40	135.78
No. 4			14	175.29			76	225.59
No. 5	1	.57	2	3.47			13	6.79
No. 6			6	85.25			32	139.70
No. 7			9	113.39			44	179.53
No. 8	1	.27	12	62.40			50	76.49
No. 9	2	.17	11	106.33			58	146.82
Total	17	8.15	92	763.10	6	7.63	419	1,118.30

traffic in a satisfactory manner. Upon completion of the construction work and when the pavement is open to traffic, the detours or temporary routes are abandoned. The maintenance cost data for these roads, by division of work, are shown in Figure 57 and Table 46. The Maintenance cost data is given by cost components in Figure 58 and Table 46.

4. MAINTENANCE OF LARGE BRIDGES.—Separate patrols have been created for all bridges one hundred feet or more in length. Table 47 shows the number of such bridges located in the various districts, the cost of maintenance and upkeep of same and the average cost per bridge per district for the calendar year 1929.

5. CONSTRUCTION OF ADDITIONS AND BETTERMENTS.—After the original construction work has been completed it is often necessary to add certain additions and betterments not covered in the original contract. Before this work can be done the district engineer must submit a request to the Maintenance Engineer for an authorization for the contemplated work such as baffle walls, retaining walls, additional culverts, curb and gutter, etc. This request must show the location and description of the work, together with an estimate of the cost. These additions and betterments are considered as permanent

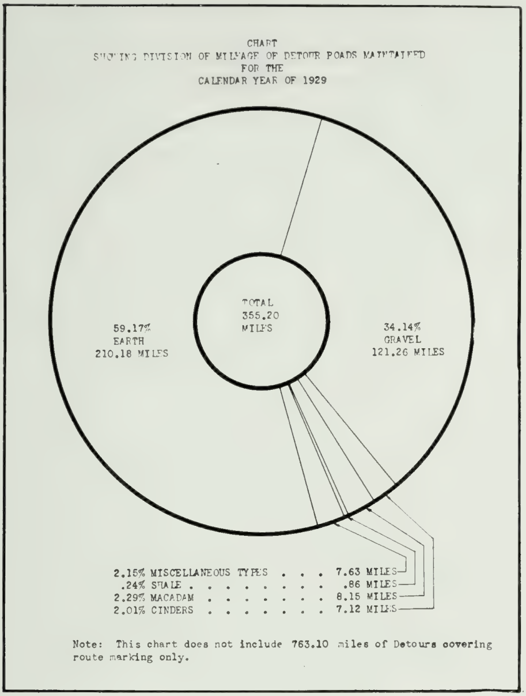


CHART
SHOWING DIVISION OF MILEAGE OF DETOUR ROADS MAINTAINED
FOR THE
CALENDAR YEAR OF 1929

Note: This chart does not include 763.10 miles of Detours covering route marking only.

Figure 56.

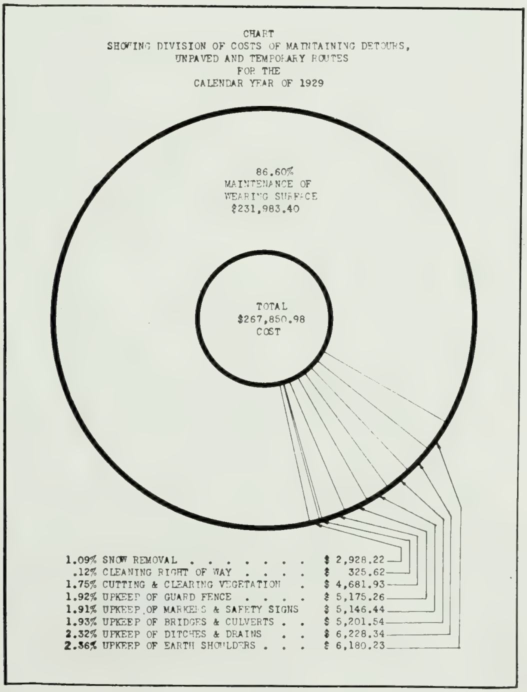


CHART
SHOWING DIVISION OF COSTS OF MAINTAINING DETOURS,
UNPAVED AND TEMPORARY ROUTES
FOR THE
CALENDAR YEAR OF 1929

Figure 57.

TABLE 46—CONSOLIDATED STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP ON ALL TYPES OF 1,118.30 MILES OF DETOURS, UNPAVED AND TEMPORARY ROUTES FOR THE CALENDAR YEAR 1929.

Account.	Labor hours.	Direct labor.	Direct material.	Direct expense.
Maintenance of Wearing Surface—				
Paved surface	198,264½	$113,154.04	$42,211.84	$25,503.99
Upkeep of roadside—				
Metal shoulders	-	-	-	-
Earth shoulders	7,703	$3,681.22	$ 125.35	$312.08
Ditches and drains	7,650½	3,583.41	360.99	385.06
Bridges and culverts	4,984	2,254.36	1,436.67	395.82
Markers and safety signs	5,043½	2,705.91	779.60	282.66
Guard fence	4,472	2,048.79	1,691.25	222.35
Cutting and clearing vegetation	6,155½	2,794.37	-	499.19
Cleaning right-of-way	369	186.77	-	40.34
Snow removal	3,353	1,801.77	-	260.60
Total upkeep	39,730½	$19,056.60	$4,393.86	$2,398.10
Total maintenance and upkeep cost	237,995	$132,210.64	$46,605.70	$27,902.09

TABLE 46—Concluded.

Account.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per mile.
Maintenance of Wearing Surface—				
Paved surface	$180,869.87	$51,113.53	$231,983.40	$207.44
Upkeep of Roadside—				
Metal shoulders	-	-	-	-
Earth shoulders	$4,118.65	$2,061.58	$6,180.23	$5.53
Ditches and drains	4,329.46	1,898.88	6,228.34	5.57
Bridges and culverts	4,086.85	1,114.69	5,201.54	4.65
Markers and safety signs	3,768.17	1,378.27	5,146.44	4.60
Guard fence	3,962.39	1,212.87	5,175.26	4.63
Cutting and clearing vegetation	3,293.56	1,388.37	4,681.93	4.19
Cleaning right of way	227.11	98.51	325.62	.29
Snow removal	2,062.37	865.85	2,928.22	2.62
Total upkeep	$25,848.56	$10,019.02	$35,867.58	$32.08
Total maintenance and upkeep cost	$206,718.43	$61,132.55	$267,850.98	$239.52

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* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

TABLE 47—STATEMENT SHOWING COST OF MAINTENANCE AND UPKEEP OF BRIDGES OVER 100-FOOT SPAN (LOCATED IN THE VARIOUS DISTRICTS) FOR THE CALENDAR YEAR 1929.

District.	Number of bridges.	Labor hours.	Direct labor.	Direct material.	Direct expense.
No. 1	67	1,165	$ 654.62	$202.89	$2,662.77
No. 2	41	5,334	2,960.94	733.91	143.59
No. 3	36	127	69.10	164.22	22.25
No. 4	36	1,894	898.94	522.05	401.62
No. 5	26	1,970	871.06	313.90	119.27
Mo. 6	23	1,312½	710.35	339.60	80.85
No. 7	11	531	233.15		57.69
No. 8	25	1.034	474.46		116.74
No. 9	36	4,946	2,509.36	727.53	269.11
Total	301	18,313½	$9,381.98	$3,004.10	$3,873.89

TABLE 47—Concluded.

District.	Total direct cost.	Indirect expense.*	Total cost.	Average cost per bridge.
No. 1	$3,520.28	$ 337.75	$3,858.03	$ 57.58
No. 2	3,838.44	1,475.57	5,314.01	129.61
No. 3	255.57	37.30	292.87	8.14
No. 4	1,822.61	359.65	2,182.26	60.62
No. 5	1,304.23	544.62	1,848.85	71.11
No. 6	1,130.80	389.94	1,520.74	66.12
No. 7	290.84	91.03	381.87	34.72
No. 8	591.20	200.51	791.71	31.67
No. 9	3,506.00	1,313.32	4,819.32	133.87
Total	$16,259.97	$4,749.69	$21,009.66	$69.80

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

improvements and the payment for same is made from the construction funds. The cost of such work is kept separate from maintenance costs. During the calendar year 1929, 258 authorizations were issued by the Bureau of Maintenance for the construction of additions and betterments costing $84,897.90. Table 48 shows the division of this work by districts and the items constructed.

6. SNOW REMOVAL.—The Bureau of Maintenance makes assignments of heavy trucks and snow plows to definite sections in the State and in the case of heavy snow falls in certain areas, the equipment from nearby sections having no snowfall are sent to the snowfall area to assist the local crews. In the case of general snowfalls, extra trucks and plows are hired from private owners.

The snowfall for 1929 was above the average. During the month of December a heavy snow storm occurred which covered practically the entire State. This storm was accompanied by high winds which caused excessive drifts to form on practically all east and west roads. The drifting was the worst in the history of the State since the construction of bond issue routes.

Figure 59 shows the distribution of the snowfall for 1929 and the cost of snow removal for that year is shown in Table 49.

TABLE 48—STATEMENT SHOWING COST OF ADDITIONS AND BETTERMENTS IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

Class of work.	District No. 1.	District No. 2.	District No. 3.	District No. 4.	District No. 5.
Stop signs in cities	$ 98.71		$ 3.50		
Stop signs outside cities					
Marking federal routes	1,549.42	$ 11.90	361.00	$ 790.23	$ 363.32
New pavement		824.09	264.15	5,178.21	
Widening pavement	281.96				
Widening curves	7,071.62	142.83			
Filling expansion joints	650.39	4,064.74	6,447.03	2,931.00	
New curb and gutter					166.05
New ditch weirs					
New baffle walls				4.74	710.25
New retaining wall			1,577.51		
New spillways	23.09	86.50			
Widening cuts				2,125.91	
New earth shoulders				1,714.20	
Seeding earth shoulders	283.89	990.56		131.34	39.81
New bituminous macadam shoulders			63.48		
Shoulder protection					232.71
Bridges and culverts	2,028.15	73.17	1,419.23	906.38	1,704.80
Ditches and drains	1,950.80		265.84	565.79	200.00
Markers and safety signs	1,989.19	1,369.47	5,450.88	2,096.37	4,476.47
New guard fence				99.52	
R. O. W. markers			199.88	429.69	
Lighting systems	438.12				
Special fence			545.52		
Changing stream channels				52.12	
Total cost including overhead	$16,356.34	$7,563.26	$16,598.02	$17,025.50	$7,893.41

TABLE 48—Concluded.

Class of work.	District No. 6.	District No. 7.	District No. 8.	District No. 9.	Total.
Stop signs in cities	$ 5.56			$ 320.04	$ 427.81
Stop signs outside cities	390.11				390.11
Marking federal routes	314.18	$560.40		193.41	4,143.86
New pavement	1,645.31				7,911.76
Widening pavement			$3,616.63		3,898.59
Widening curves					7,214.45
Filling expansion joints	567.11	105.63		1,513.07	16,278.97
New curb and gutter					166.05
New ditch weirs				104.86	104.86
New baffle walls	157.63	81.80		155.64	1,110.06
New retaining walls					1,577.51
New spillways					109.59
Widening cuts					2,125.91
New earth shoulders					1,714.20
Seeding earth shoulders	96.58	64.91			1,607.09
New bituminous macadam shoulders					63.48
Shoulder protection					232.71
Bridges and culverts	1,603.02				7,734.75
Ditches and drains			109.57		3,092.00
Markers and safety signs	3,080.05	531.25		3,923.55	22,908.23
New guard fence	41.68				141.20
R. O. W. markers	129.92			149.46	908.95
Lighting systems					438.12
Special fence					545.52
Changing stream channels					52.12
Total cost including overhead	$8,031.15	$1,343.99	$3,726.20	$6,360.03	$84,897.90

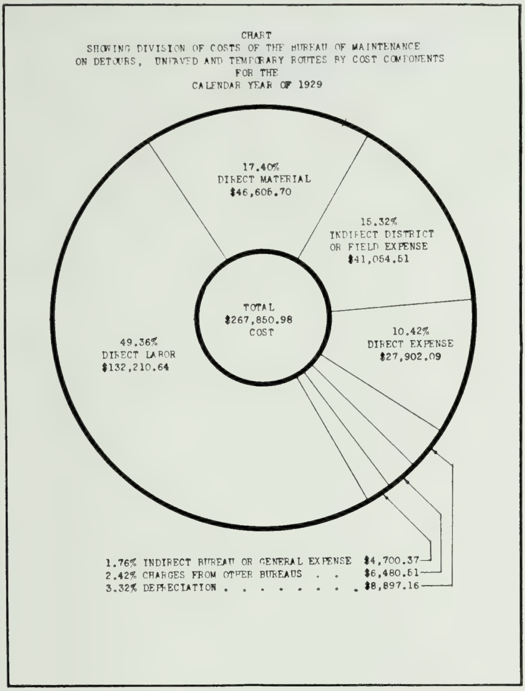

Figure 58.

Figure 60 shows a portion of a drift which formed on one of our bond issue routes. Figure 61 shows a caterpillar tractor equipped with a large snow plow breaking its way through one of the heavy drifts on one of our bond issue routes.

7. ROUTE MARKERS AND SIGNS.—The type of route markers and signs used in Illinois complies with the regulations adopted by the U. S. Bureau of Public Roads and the American Association of State Highway Officials for the uniform marking of the principal highways of the United States.

The designs are based on definite principles calculated to produce uniformity of significance in the signs themselves, and make familiarity with them easy to acquire on the part of the most casual driver. These principles are a set of shapes each having its own significance; a set of color combinations each having its own significance; a few obvious symbols; and uniformity of erection and application.

a. *Shape.*—The shape of these signs indicates to the driver the degree of care which he should exercise. The square sign indicates a minimum degree of danger, or "look", the diamond shaped sign indicates an intermediate degree of danger or "slow" speed and "caution", the octagonal sign indicates a maximum degree of danger or "stop". Circular signs are used at railroad crossings and rectangular shaped signs of various dimensions are used to carry directions, information and restrictions of use or benefit to the driver. Shields are used to mark Federal routes.

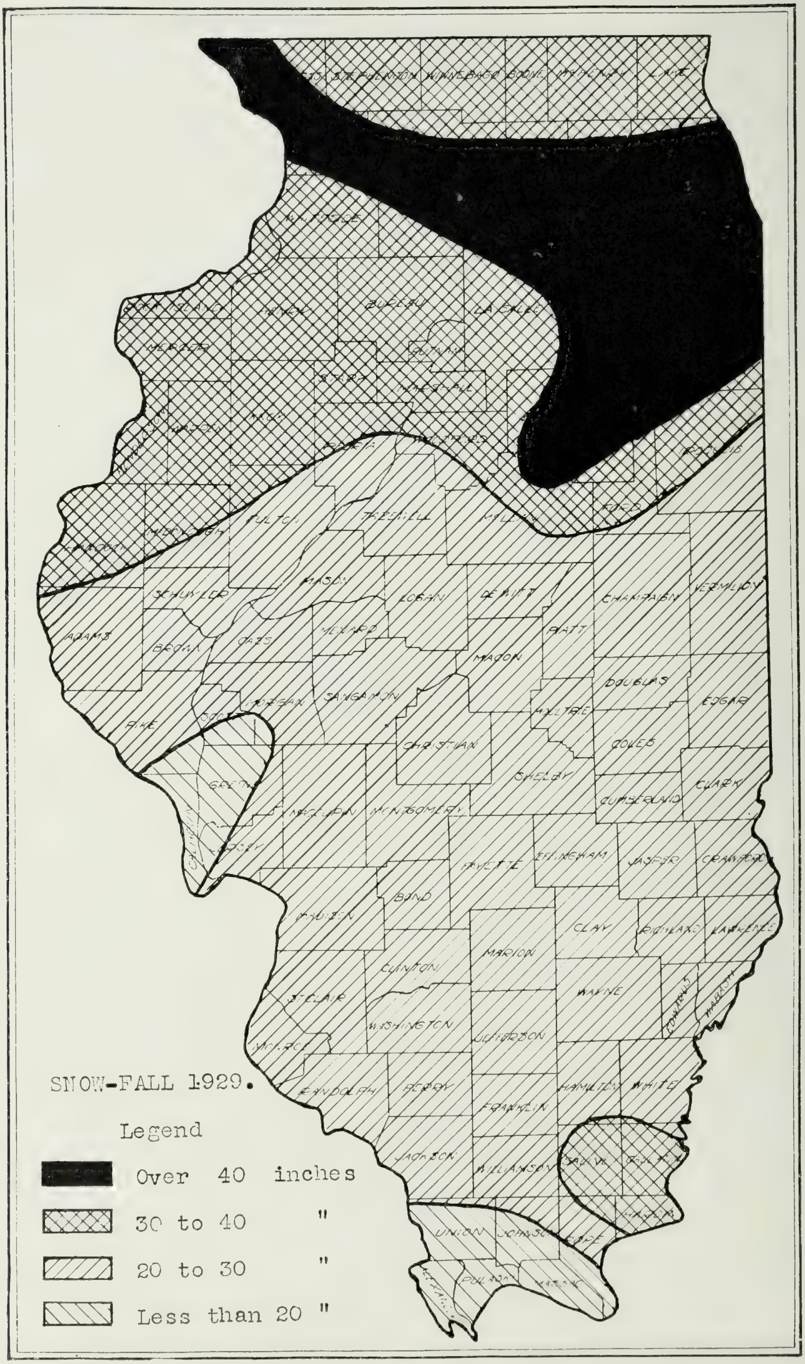
SNOW-FALL 1929.
Legend
Over 40 inches
30 to 40 "
20 to 30 "
Less than 20 "
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
LAKE
WHITESIDE
ROCK ISLAND
HENRY
BUREAU
LA SALLE
MERCER
PUTNAM
STARK
MARSHALL
KNOX
PEORIA
WOODFORD
IROQUOIS
FORD
HANCOCK
MCDONOUGH
FULTON
TAZEWELL
MCLEAN
SCHUYLER
MASON
LOGAN
DE WITT
CHAMPAIGN
VERMILION
ADAMS
BROWN
CASS
MENARD
PIATT
MACON
MORGAN
SANGAMON
DOUGLAS
EDGAR
PIKE
MOULTRIE
CHRISTIAN
COLES
SHELBY
GREENE
CUMBERLAND
CLARK
CALHOUN
JERSEY
MACOUPIN
MONTGOMERY
EFFINGHAM
JASPER
CRAWFORD
FAYETTE
BOND
MADISON
CLAY
RICHLAND
LAWRENCE
CLINTON
MARION
ST. CLAIR
WAYNE
EDWARDS
WABASH
WASHINGTON
JEFFERSON
MONROE
RANDOLPH
PERRY
HAMILTON
WHITE
FRANKLIN
JACKSON
WILLIAMSON
SALINE
GALLATIN
HARDIN
UNION
JOHNSON
POPE
PULASKI
MASSAC

Figure 59.

TABLE 49—STATEMENT SHOWING COST OF REMOVING SNOW ON SURFACED ROADS FOR THE NORTHERN, CENTRAL AND SOUTHERN ZONES FOR THE CALENDAR YEAR 1929.

District number.	Weighted average mileage.	Labor hours.	Direct labor.	Direct expense.
No. 1	1,432.73	65,011½	$40,897.94	$15,073.90
No. 2	830.77	41,154	19,818.30	7,425.13
No. 3	1,202.26	21,620½	11,349.59	8,657.95
No. 4	911.43	34,788½	16,975.15	10,844.90
Total for Northern District	4,377.19	162,574½	$89,040.98	$42,001.88
No. 5	976.06	13,162	$6,741.21	$3,918.02
No. 6	623.39	16,333½	7,851.31	2,594.80
Total for Central District	1,599.45	29,495½	$14,592.52	$6,512.82
No. 7	550.14	6,372½	$ 3,230.63	$ 944.97
No. 8	530.75	22,168½	10,098.78	3,564.43
No. 9	462.82	4,479½	2,296.38	861.06
Total for Southern District	1,543.71	33,020½	$15,625.79	$5,370.46
Total for entire State	7,520.35	225,090½	$119,259.29	$53,885.16

TABLE 49—Concluded.

District number.	Direct total cost.	Overhead expense.	Total cost.	Average cost per mile.
No. 1	$55,971.84	$18,847.60	$74,819.44	$52.22
No. 2	27,243.43	11,384.64	38,628.07	46.50
No. 3	20,007.54	6,350.65	26,358.19	21.92
No. 4	27,820.05	6,605.81	34,425.86	37.77
Total for Northern District	$131,042.86	$43,188.70	$174,231.56	$39.80
No. 5	$10,659.23	$3,638.74	$14,297.97	$14.64
No. 6	10,446.11	4,852.66	15,298.77	24.54
Total for Central District	$21,105.34	$8,491.40	$29,596.74	$18.50
No. 7	$ 4,175.60	$1,092.45	$ 5,268.05	$ 9.58
No. 8	13,663.21	4,298.94	17,962.15	33.84
No. 9	3,157.44	1,189.45	4,346.89	9.39
Total for Southern District	$20,996.25	$6,580.84	$27,577.09	$17.86
Total for entire State	$173,144.45	$58,260.94	$231,405.39	$30.77

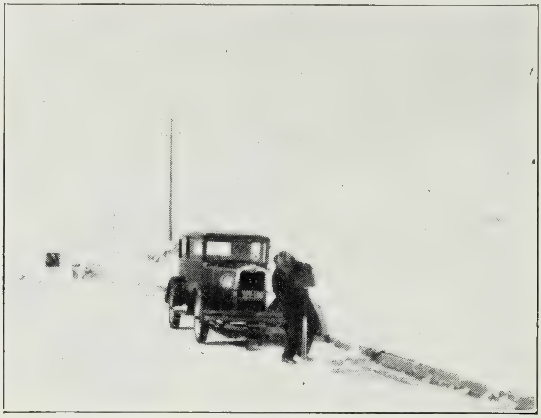

Figure 60.—Snow drift on a State Bond Issue Route. December, 1929.

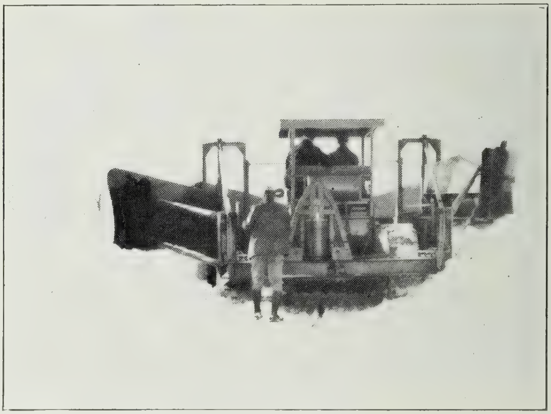

Figure 61.—Moving a snow drift from a State Bond Issue Route. December, 1929.

b. Color.—All signs of a precautionary character, except in the case of the circular railroad sign and the large "danger" sign, have black designs on a yellow background. The railroad signs are black on a white background and the large "danger" signs are red on a white background. All route markers, and all direction, information and restriction signs are black on a white background.

c. Symbols.—The symbols used on the various signs are those for railroad grade crossings, both for single and multiple tracks, for left and right curves and turns, for reversed curves and turns; the arrow on the directional sign and the arrow which accompanies the route marker.

d. Series.—The marker series are for the purpose of directing traffic over the different routes. The caution and warning series cover a large variety of conditions which it is desirable to meet in the interest of safety. The direction and information series are intended to furnish the traveler with directional and general information, but involving nothing of a precautionary nature. The restriction series are used to warn the traveler of legal restrictions necessary to make the highway safer and to preserve the road and its beauty.

At railroad crossings, in addition to the circular warning sign, the pavement has diagonal black and white stripes painted upon it at intervals of one hundred feet, the first being at a distance of four hundred feet from the nearest rail. (Figure 62.)

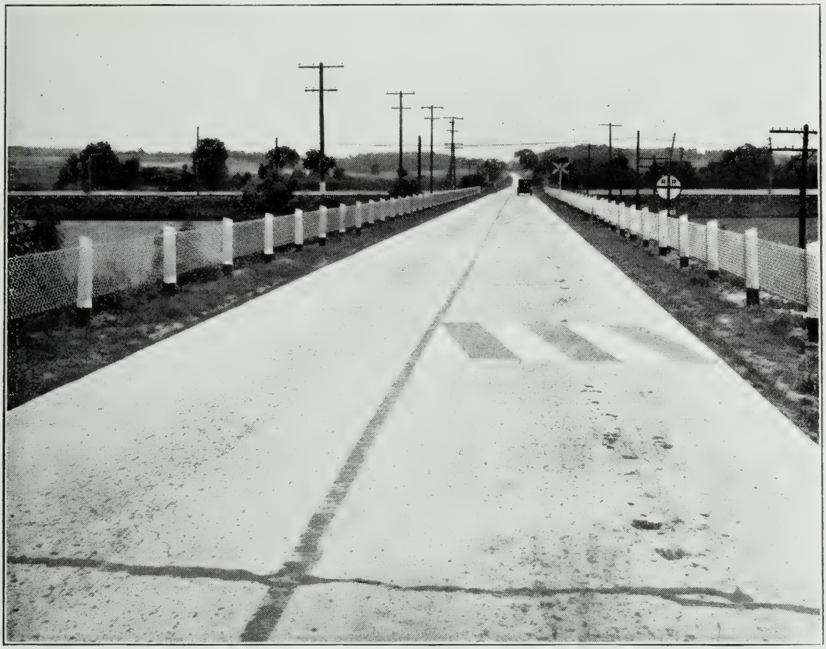

Figure 62.—Pavement markings and warning sign at a railroad crossing.

An asphalt traffic line is applied down the center of all hard surfaced roads. The purpose of this line is to guide the traffic and to protect the center construction joint. A machine developed by the Bureau of Maintenance is used to apply the asphalt. An average day's work for one machine is approximately twenty miles.

A few examples of the various markers and signs used are shown in Figures 63 to 67, inclusive.

The cost of route marking and safety signs for 1929 is shown by cost components in Table 50.

8. RIGHT OF WAY POSTS.—To prevent the encroachment of property owners on State right of way and for permanent marking the Department has adopted the policy of setting of concrete right of way marker posts at the right of way lines. These posts are made at the Southern Illinois State Penitentiary at Chester, the State paying for the material and the Penitentiary furnishing convict labor. In 1929 approximately 18,914 posts were made.

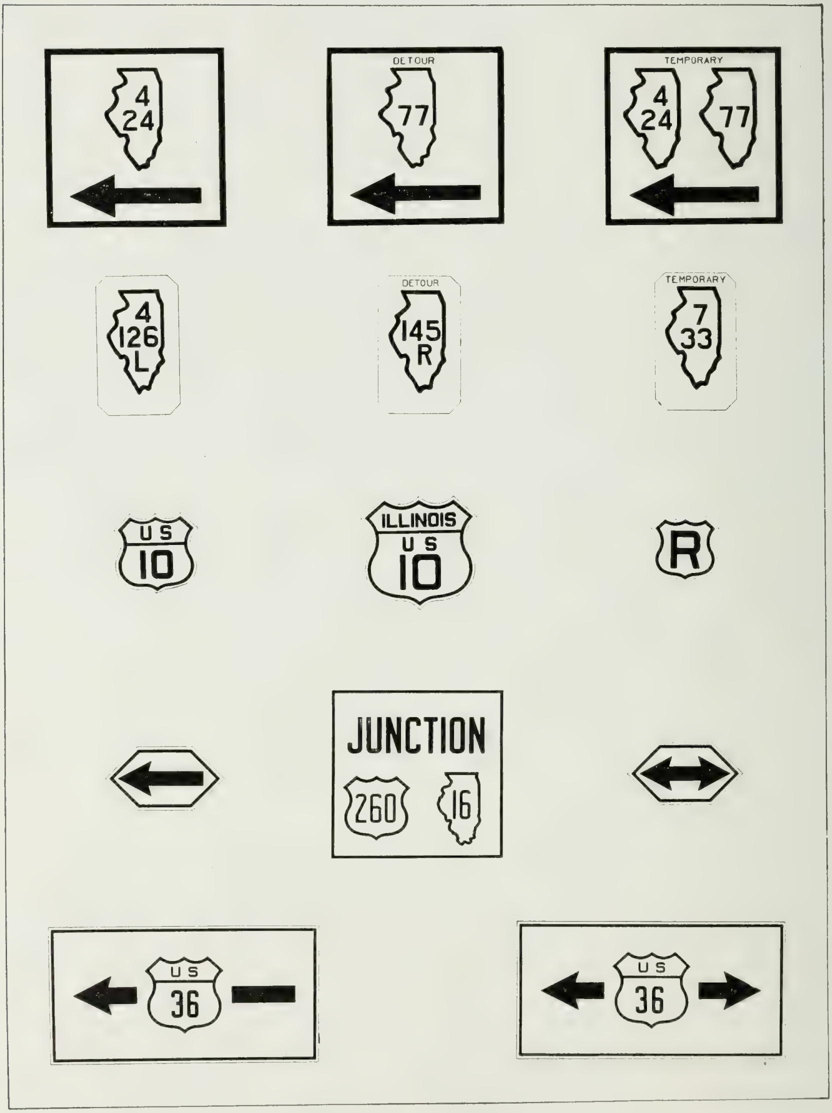

Figure 63.—Marker Signs.

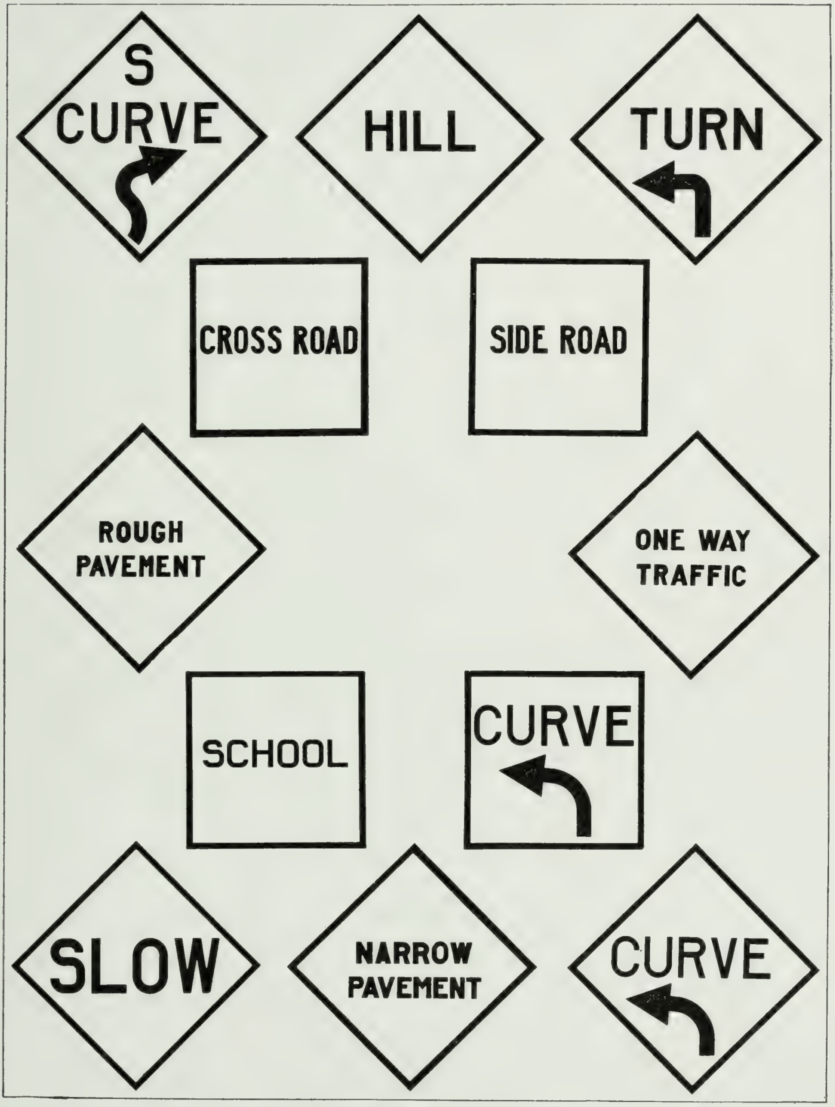

Figure 64.—Caution Signs.

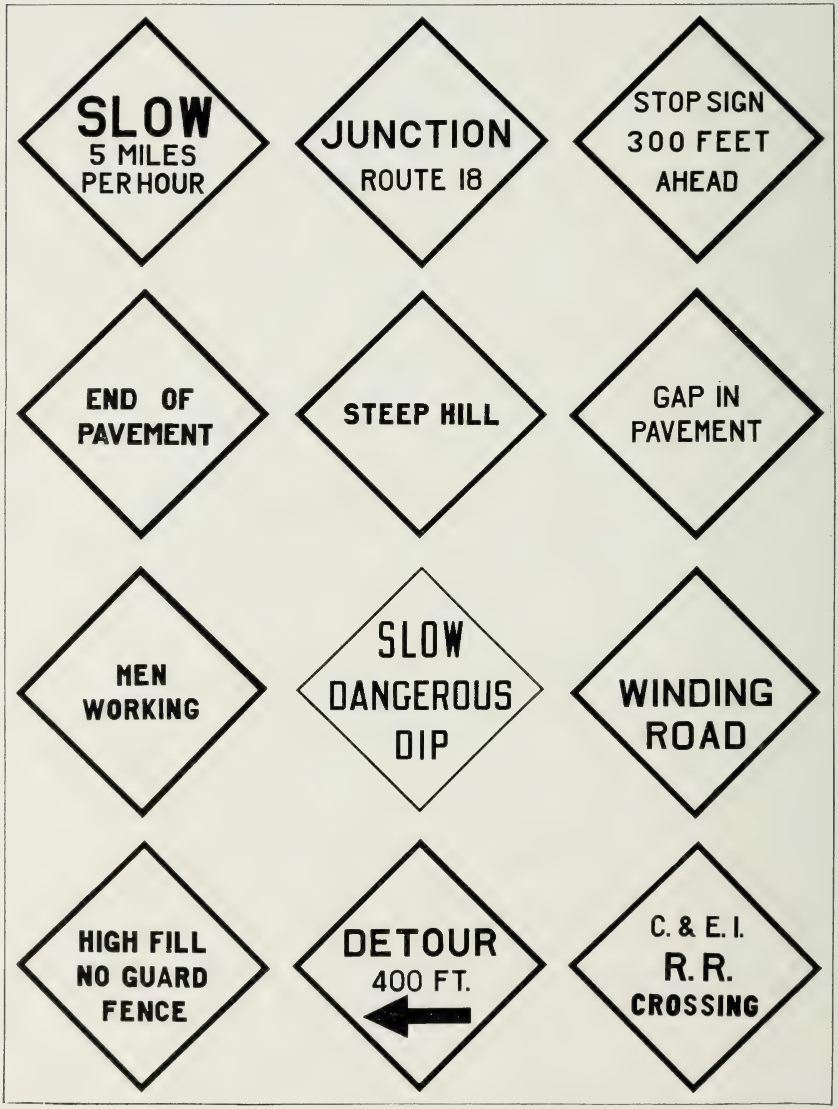

Figure 65.—Caution Signs.

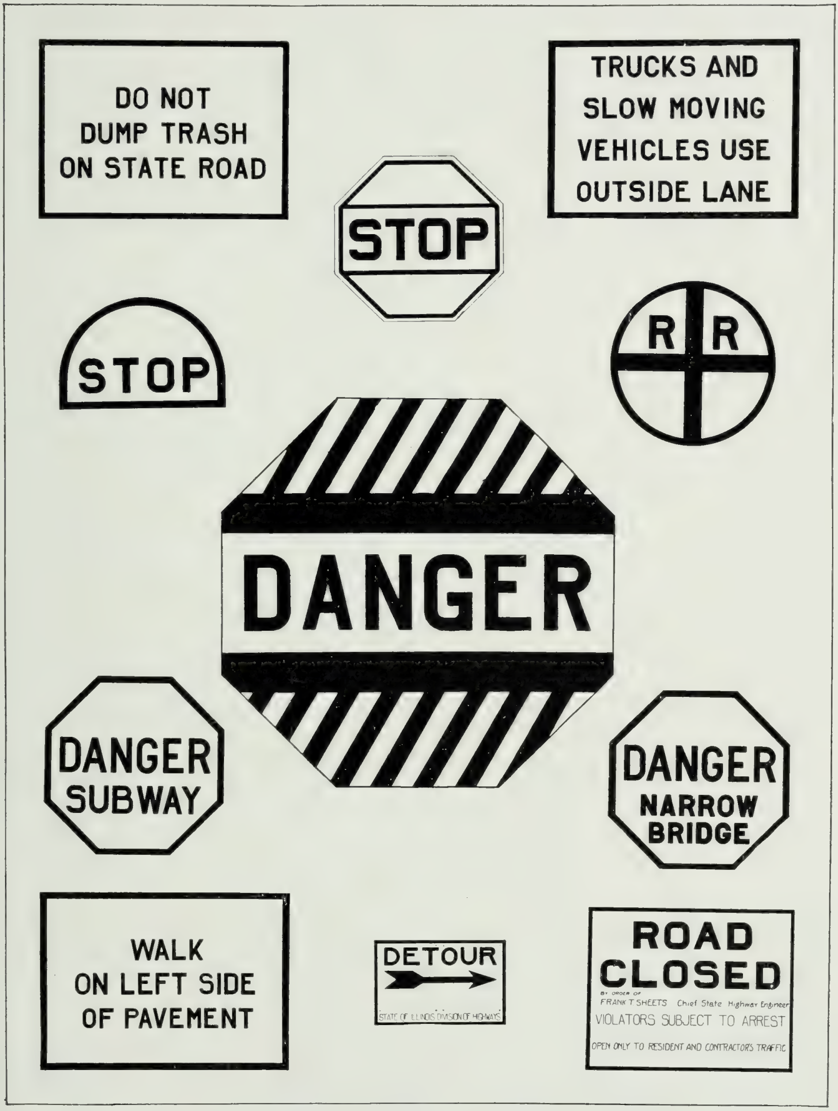

Figure 66.—Caution, Warning and Restriction Signs.

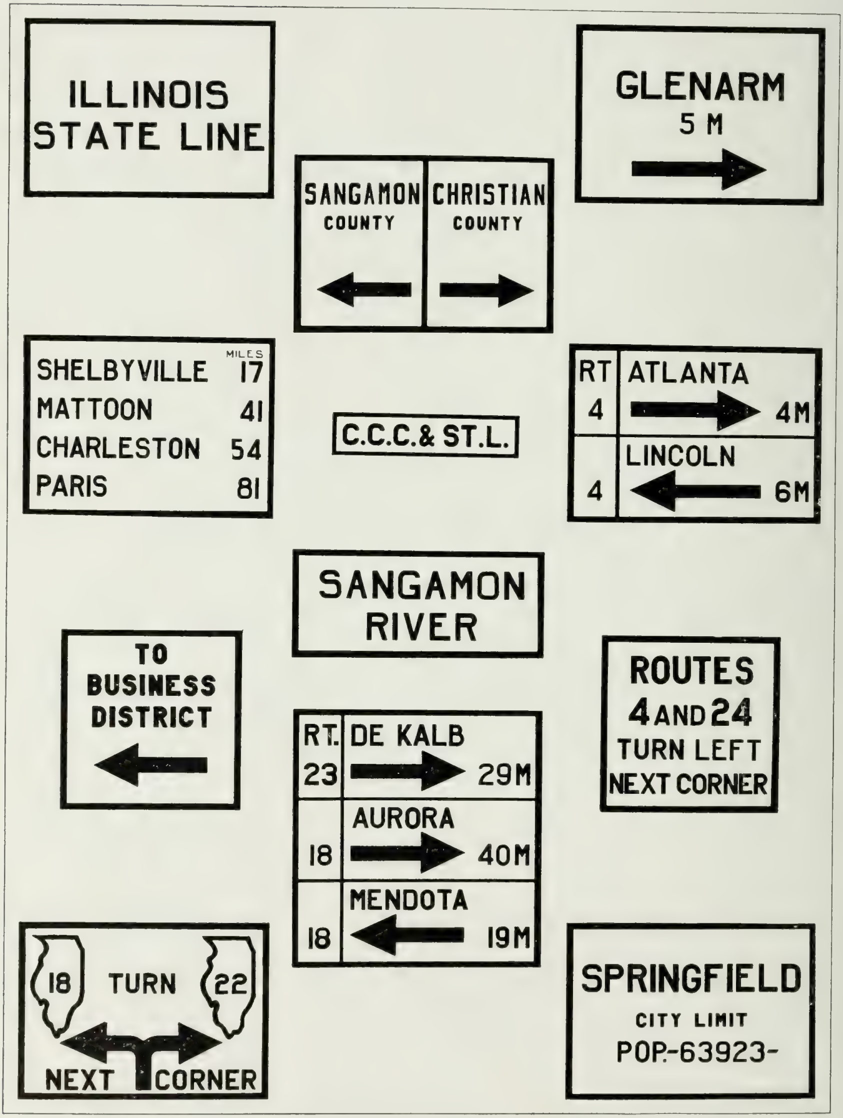

Figure 67.—Direction and Information Signs.

TABLE 50—STATEMENT SHOWING COST OF MARKING ROUTES THROUGH CITIES IN ALL DISTRICTS FOR THE CALENDAR YEAR 1929.

District.	Labor hours.	Direct labor.	Direct material.	Direct expense.	Total direct cost.	Indirect expense.*	Total cost.
No. 1	22,762	$14,213.50	$ 20.49	$518.31	$14,752.30	$6,598.97	$21,351.27
No. 2	1,043½	560.85	19.70	177.70	758.25	288.67	1,046.92
No. 3	2,875	1,491.65	374.86	117.46	1,983.97	844.48	2,828.45
No. 4	3,307	1,576.66	50.46	115.71	1,742.83	627.96	2,370.79
No. 5	1,981	933.35	----------	----------	933.35	547.66	1,481.01
No. 6	834	401.75	8.05	----------	409.80	247.78	657.58
No. 7	1,803	837.40	254.90	23.95	1,116.25	309.09	1,425.34
No. 8	1,660	845.99	----------	----------	845.99	321.91	1,167.90
No. 9	1,330	686.15	46.05	16.38	748.58	353.16	1,101.74
Total	37,595½	$21,547.30	$774.51	$969.51	$23,291.32	$10,139.68	$33,431.00

* Includes gas, oil, grease, repairs and parts for trucks; depreciation of equipment and office overhead for both central and district offices.

9. EQUIPMENT.—Heavy equipment used in the maintenance of the 7,772.80 miles of surfaced roads and the 355.20 miles of detours, unpaved and temporary routes during the calendar year 1929, includes the following listed machinery in addition to numerous tools and miscellaneous supplies such as shovels, axes, jacks, rope, crow bars, hammers, saws, etc.:

Item	Number	Item	Number
Heavy trucks	254	Caterpillar tractors	35
Light trucks	515	Fordson tractors	17
Passenger cars	55	Truck cranes	2
Road graders	318	Slip scrapers	208
Asphalt heating kettles	241	Wheelbarrows	315
Concrete mixers	35	Wheel scrapers	42
Road drags	297	Traffic line machines	10
Air compressors	10	Mowing machines	163
Snow plows	382		

10. PERMITS AND FRANCHISES.—All property owners, corporations, public utilities desiring to perform work of any nature within the limits of the right of way are required by law to obtain a permit from the Division of Highways before such work can be done. An investigation is made of all requests to determine the advisability of issuing the permits. The Bureau of Maintenance prepares the forms showing the location and the nature of the work. The legal aspects of the permit are investigated and then submitted to the Chief Highway Engineer for his approval.

These permits enable the Division of Highways to control the placing of all items within the highway right of way by private interests, companies, or corporations and thereby preserving the highways for highway purposes.

During the year 1929, 2,878 permits were issued covering the construction of entrances to private properties, gasoline filling stations, lunch stands, telephone and telegraph lines, electric power transmission lines, water mains, gas mains, cable conduits and sewers.

11. ROUTE BULLETINS.—The Bureau of Maintenance continued the publication of a route bulletin giving information of all routes. This bulletin was published in June, 1929, and consisted of a detailed description of each route, distance between towns and cities on

the various routes, kinds and condition of the pavement or road surfaces, and in a general way indicates the population of the towns, and the location of tourist camps.

This bulletin is furnished free to automobile clubs, hotels, filling stations, garages and other places where it would be available to the traveling public.

12. COST ACCOUNTING.—The cost accounting system now used by the Bureau of Maintenance permits a very complete analysis of the cost of the various classes of work carried on by types, years of construction and by districts. During the year 1929, 1,111.66 additional miles of surfaced road were taken over for maintenance without an increase in the accounting force by using this accounting system.

The Bureau of Maintenance during the year 1929, issued 34,919 vouchers involving a total expenditure from the maintenance fund of $3,257,131.14. A complete trial balance for the year 1929 covering the transactions of the Bureau is shown in Table 51. The debits of the above trial balance are shown by division of activities in Figure 68 and the credits are shown according to their source in Figure 69.

TABLE 51—TRIAL BALANCE COVERING TRANSACTIONS OF THE BUREAU OF MAINTENANCE FOR THE CALENDAR YEAR 1929.

DEBITS.

Maintenance of surfaced roads—		
District No. 1 patrol costs	$651,598.93	
District No. 2 patrol costs	235,343.09	
District No. 3 patrol costs	281,101.51	
District No. 4 patrol costs	251,698.18	
District No. 5 patrol costs	246,811.17	
District No. 6 patrol costs	178,063.76	
District No. 7 patrol costs	157,775.20	
District No. 8 patrol costs	290,612.04	
District No. 9 patrol costs	161,903.44	$2,454,907.32
Maintenance of detours—		
District No. 1 patrol costs	$44,616.50	
District No. 2 patrol costs	20,784.76	
District No. 3 patrol costs	23,438.94	
District No. 4 patrol costs	48,924.66	
District No. 5 patrol costs	10,425.68	
District No. 6 patrol costs	20,482.61	
District No. 7 patrol costs	30,043.65	
District No. 8 patrol costs	15,966.24	
District No. 9 patrol costs	53,167.94	$267,850.98
Construction of additions and betterments—		
District No. 1 section costs	$16,356.34	
District No. 2 section costs	7,563.26	
District No. 3 section costs	16,598.02	
District No. 4 section costs	17,025.50	
District No. 5 section costs	7,893.41	
District No. 6 section costs	8,031.15	
District No. 7 section costs	1,343.99	
District No. 8 section costs	3,726.20	
District No. 9 section costs	6,360.03	$ 84,897.90
Police officers' costs		467,191.14
Police officers equipment		37,379.32
Maintenance, machinery and equipment		146,935.45
Sign and post shop inventory		10,665.29
Maintenance cash refunds		61,522.80
Total debits		$3,531,350.20

Table 51—Concluded.

CREDITS.

Highway maintenance road fund Fifty-fifth General Assembly	$1,409,088.25
Highway construction road fund Fifty-fifth General Assembly	31,361.51
Highway construction bond fund Fifty-fifth General Assembly	10,971.38
Highway maintenance road fund Fifty-sixth General Assembly	1,815,912.31
Highway construction road fund Fifty-sixth General Assembly	5,405.57
Highway construction bond fund Fifty-sixth General Assembly	25,514.44
County State Aid maintenance appropriations	27,711.94
Allowance for depreciation	94,466.15
Bureau of Machinery	88,744.60
Bureau of Construction (day labor)	506.32
Bureau of Materials	12,925.84
Amounts paid by counties on 50-50 maintenance in excess of amounts charged	8,741.89
Total credits	$3,531,350.20

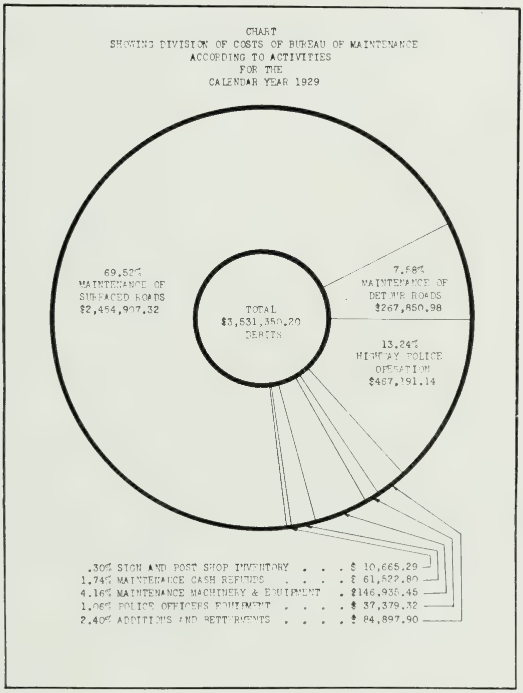

Figure 68.

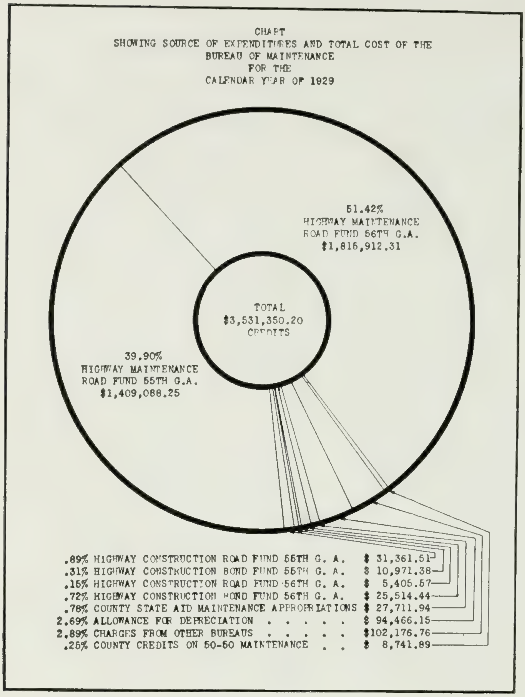

Figure 69.

13. ACCIDENT REPORTS.—A system of reporting accidents occurring on the State highways, based upon the system recommended by the National Safety Council and now used in several other states, was in effect during 1929 in the Maintenance Department. By this system, maintenance employees and highway maintenance policemen forwarded to the Springfield office reports showing the cause and location of accidents and injuries, deaths and damages resulting from them. The location of accidents is shown on a map, tabulations are prepared each month, and summarized at the end of the year. These data are studied with a view of avoiding similar accidents by eliminating as many of the causes as possible. The following tabulation shows a summary of the accident reports received during the year 1929:

*Number of accidents reported	721
Persons killed	165
Persons injured	635

PRINCIPAL CAUSES OF THE ACCIDENTS.

Mechanical defects of vehicle	32	Lost control of car	37
Blinded by lights, snow or fog	45	No lights on car	16
Carelessness	72	Parking on pavement	22
Reckless driving	81	Skidded	68
Collisions	10	Speeding	82
Pedestrians struck	25	Sleeping driver	16
Failure to stop at stop sign	52	Unknown causes	2
Intoxicated driver	27	Miscellaneous	134

---

* Percentage of the total number of accidents which this figure represents is not known. It is difficult to obtain a report on all of them.

WHAT WAS EACH DRIVER DOING?

39	Turning right.
105	Turning left.
514	Going straight through.
50	Slowing down or stopping.
4	Backing.
37	Parked or standing still.
33	Avoiding pedestrian or vehicle.
89	Skidding.
11	Double or prohibited parking.
77	Exceeding speed limit.
92	On wrong side of road.
60	Did not have right of way.
44	Cutting in.
0	Passing standing street or interurban car.
21	Passing on curve or hill.
7	Passing on wrong side.
15	Failed to signal.
18	Improper turning.
20	Failed to stop at through highway or street.
10	Disregarded officer or signal.
51	Drove or crowded off roadway.
9	Drove through safety zone.

DRIVER'S CONDITION.

35	Driver was intoxicated.
14	Had physical defect.
11	Was asleep.
24	Extremely fatigued.

DRIVER'S VIEW OBSTRUCTED BY—

4	Growing crops.
2	Shrubbery or trees.
5	Embankment.
10	Buildings.
26	Fog or smoke.
6	Dust.
4	Curtains on car.
55	Rain, snow, etc., on windshield.
18	Other object—describe.

PEDESTRIAN'S CONDITION.

1	Intoxicated.
4	Had physical defect.
7	Was confused by traffic.
3	His view obstructed.

CONDITION OF ROAD.

412	Dry.
144	Wet.
23	Muddy.
80	Snowy or icy.
4	Roadway torn up.
3	Obstruction not lighted.
3	Loose gravel or stone.
6	Foreign material on surface.
1	Defect in roadway—describe.

GENERAL ROAD LOCATION.

65	Between intersections.
67	Road or street intersection.
25	Driveway or alley intersection.
362	Straight road.
98	Curve.
18	Turn.
26	Steep grade.
7	Narrow bridge or culvert.
9	Narrow roadway.

FIXED OBJECT STRUCK.

22	Bridge.
30	Culvert headwall.
41	Deep ditch.
25	Pole (telephone, power line).
7	Tree.
28	Distance of pole or tree from center of road.
31	Other fixed object—describe.

CONDITION OF EACH VEHICLE.

13	Brakes defective.
10	Steering mechanism defective.
8	Glaring headlights.
5	Headlights too dim.
8	One or both headlights out.
13	Tail light out or obscured.
80	No chains on slippery road.
14	Puncture or blowout.
7	Other defects—describe.

WHAT WAS PEDESTRIAN DOING?

0	Crossing at intersection with signal.
0	Crossing at intersection against signal.
2	Crossing at intersection—no signal.
0	Crossing at intersection — diagonally.
8	Crossing between intersections.
4	Walking in road—left side (against traffic).
4	Walking in road—right side (with traffic).
3	Playing in street or road.
2	Riding or hitching on vehicle.
0	Waiting for or getting on or off street car at safety zone.
0	Waiting for or getting on or off street car no safety zone.
1	Getting on or off other vehicle.
3	In work in roadway.
1	Not in roadway.
5	Other actions—describe.

RAILROAD OR INTERURBAN CROSSINGS.

19	Unguarded crossing.
0	Gates down.
0	Gates up.
7	Automatic signal—working.
0	Automatic signal—not working.
2	Watchman—signalled properly.
0	Watchman—failed to signal.
0	Watchman (part time) not on duty.

WEATHER CONDITIONS.

379	Clear.
111	Cloudy.
45	Fog or mist.
64	Rain.
13	Snow.

LIGHT CONDITIONS.

349	Day light.
65	Dusk.
74	Darkness—good artificial light.
26	Darkness—poor artificial light.
105	Darkness—no artificial light.

14. BUREAU OF POLICE.—

a. The police organization consists of a chief, thirteen sergeants, 181 officers and 2 mechanics. It is their duty to enforce the provisions of the Motor Vehicle Law and Road and Bridge Law and to furnish information relative to the legal use of the highways to the traveling public.

House Bill No. 586, approved June 10, 1929, amends sections 1 and 2 of an act concerning highway maintenance police, approved June 29, 1923, and also repeals sections 3 and 6 of the old act which gave the State highway maintenance police full powers and duties as police officers.

On September 1, 1929, a new superintendent of police was appointed and the police organization completely reorganized.

b. Equipment.—Each sergeant and a large number of the police officers are equipped with Ford cars, while the remainder of the officers are furnished with a motorcycle. Portable scales for weighing trucks are furnished the officers and are carried in their Ford cars. Uniforms and all equipment are furnished by the Division of Highways.

c. Cost and Work Accomplished.—The work accomplished by the highway policemen during the calendar year 1929 is shown in Table 52. Figure 70 shows the division of costs for this organization for 1929.

TABLE 52—TABULATION SHOWING ACTIVITIES OF STATE HIGHWAY POLICE FORCE FOR THE YEAR 1929.

Offense.	Arrests.
Trucks overweight	1,359
Speeding (passenger cars)	659
Speeding (busses)	82
Speeding (trucks)	669
Licenses (none)	485
Licenses (fictitious)	484
Licenses (chauffeur)	233
Lights (none)	748
Lights (bright)	13
Defective tires	112
Intoxicated drivers	342
Reckless drivers	578
Racing on highways	30
Leaving scene of accident	26
Leaving motor running	5
Blocking traffic	46
Defective brakes	11
No mirror	44
Stealing cars	197
Larceny	134
Disorderly conduct	301
Concealed weapons	6
Assault	13
Speed control devices	40
Overwidth	20
Perjury	2
Forgery	15
Failure to stop on entering State highway	2,524
Whistles, gongs and bells	12
Desertion	7
Accepting stolen property	1
Confidence game	1
Attempted murder	2
Vagrancy	2
Injuring pavement	23
Defacing engine numbers	12
Resisting arrest	5
Impersonating an officer	1
Transporting liquor	3
Robbers captured	29
Murderers captured	1
Manslaughter	1
Mann Act	2
Kidnapping	1
Bastardy	1
Jail breakers	6
Abduction	2
Driving under age	1
Conspiracy	2
Violating parole	3
Total	9,296

OTHER ACTIVITIES.

Stolen cars recovered	304
Trucks weighed	16,584
Trucks overweight	1,931
Speeders warned	21,591

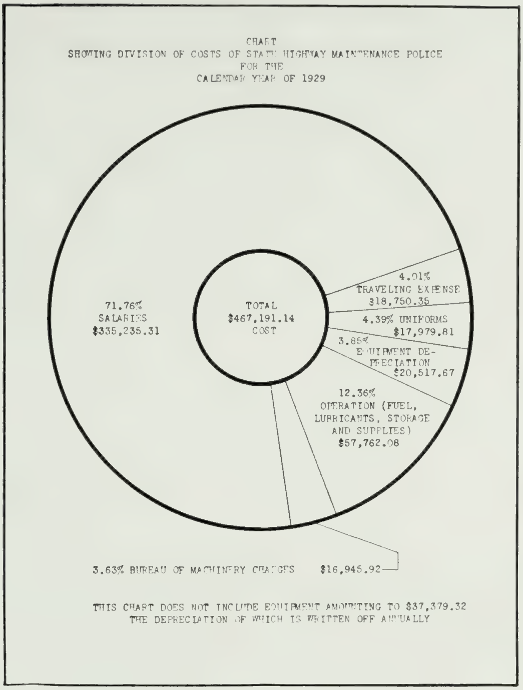
CHART
SHOWING DIVISION OF COSTS OF STATE HIGHWAY MAINTENANCE POLICE
FOR THE
CALENDAR YEAR OF 1929
TOTAL
$467,191.14
COST
71.76%
SALARIES
$335,235.31
4.01%
TRAVELING EXPENSE
$18,750.35
4.39% UNIFORMS
$17,979.81
3.85%
EQUIPMENT DEPRECIATION
$20,517.67
12.36%
OPERATION (FUEL, LUBRICANTS, STORAGE AND SUPPLIES)
$57,762.08
3.63% BUREAU OF MACHINERY CHARGES
$16,945.92
THIS CHART DOES NOT INCLUDE EQUIPMENT AMOUNTING TO $37,379.32
THE DEPRECIATION OF WHICH IS WRITTEN OFF ANNUALLY

Figure 70.

VI. BUREAU OF AUDITS.

1. DUTIES.—The Bureau of Audits is responsible for the following:

a. Accounting and auditing of all road and bridge revenues and expenditures accruing to or expended by the Division of Highways.

b. Preparation of financial statements and estimates.

c. Preparation of statistics and cost data relating to construction, maintenance, finances, equipment, and the various other activities of the Division.

d. Checking of permits, franchises, contracts, agreements, leases, rentals, bonds, payment estimates, payrolls, and expense accounts.

e. Preparation and handling of requisitions for supplies and equipment.

f. Recording and filing of all claims, liens, and assignments against contractors.

g. Accounting for cement furnished to the various road contracts.

h. Distribution of supplies, engineering equipment, letting notices, bulletins, pamphlets, highway maps, etc.

i. Handling of the blueprinting, mimeographing, and addressograph work of the Division.

j. The handling of all correspondence files of the Division through the central and storage files.

This work is accomplished through the following sections:

1. ADMINISTRATIVE.
2. ACCOUNTING.
3. BLUEPRINTING AND SUPPLIES.
4. CENTRAL AND STORAGE FILES.

The Chief Clerk is the principal officer of this Bureau and is assisted by an Assistant Chief Clerk, and by the heads of the various sections of the organization.

2. ADMINISTRATIVE SECTION.—The work of this section is under the immediate control of the Chief Clerk and consists of the general planning and administrative work of the Bureau and the various sections which comprise it.

All requests for permits or franchises for the use of the State highways for the construction of entrances to private properties, gasoline filling stations, lunch stands, and to companies and corporations for the privilege of placing and maintaining telephone and telegraph lines, electric power transmission lines, water mains, cables, conduits, sewers, and bus lines are carefully investigated in this section as to their legal aspects before being approved by the Chief Highway Engineer. A total of 2,878 permits of this nature were handled during 1929.

All contracts for State road work, for cement, and agreements covering rentals or leases are prepared in or submitted to this section for approval before being forwarded to the officers of the department for signature.

This section also handles a large volume of correspondence which is submitted by counties and townships relating to various highway legislative and legal matters; it arranges and prepares for examinations to be held to fill existing vacancies for the position of county superintendent of highways; and it also has charge of the janitor, messenger, and mailing service of the Division.

3. ACCOUNTING SECTION.—This section of the Bureau of Audits handles the finances, budget, accounts, requisitions for equipment, supplies, and materials, appropriation and fund records, checks and pays all payrolls, engineers' payments estimates, expense accounts, and miscellaneous bills of the Division. It receives, records, and files all claims, liens, and assignments against contractors, and accounts for cement furnished by the State to the various road contracts. It is responsible for the receipt and deposit of funds accruing to the Division from various sources, and accounts and reconciles fifteen bank accounts which are carried for the purpose of paying laborers promptly who are engaged in maintenance and day labor work and all cost and statistical work of the Division is centralized in this section of the Bureau of Audits.

The section is so organized as to make it possible to furnish the administrative officers of the Division with prompt information regarding finances, construction, maintenance, equipment, etc., as may be required from time to time.

The accounts of the Division of Highways which are kept in this section are being developed as rapidly as possible to conform to the standards which have been created by the committee on accounting of the American Association of State Highway Officials.

During 1929, 57,745 vouchers, amounting to $32,286,832.16 were paid through this section, itemized as follows:

1. Administration and engineering	$ 2,127,858.05
2. Construction	26,901,842.97
3. Maintenance	3,257,131.14
Total	$32,286,832.16

It is the policy of this section to take advantage of cash discounts at all times, which during 1929 amounted to $254,441.02 derived from the following sources:

Cement invoices	$216,916.25
Gasoline invoices	30,847.52
Oil invoices	2,106.95
Miscellaneous	4,570.30
Total discounts taken	$254,441.02

All freight bills passing through the section for payment are referred to the freight rate expert of the Division where the rates, extensions, and classifications are checked before they are paid. Where the bills bear notation of damage or shortage, they are followed with the transportation companies and refunds are secured.

The amounts saved to the Division of Highways in cash discounts, and in the collection of shortage and damage claims during 1929 amounted to $255,464.21 which would pay 12 per cent of the entire administration and engineering costs of the Division for the calendar year 1929; or would pay the expense of operating the accounting section for a period of $2\frac{1}{2}$ years; or if used for construction, would result in an additional mileage of $8\frac{1}{2}$ miles.

Every effort was made during 1929 to place the records and accounts on a business like basis. For many years the Division operated under the single entry system of accounting, which we have found does not meet the needs or requirements of the Bureau, but during 1929 much progress was made in developing a more logical and practical system of accounting, whereby eventually all records and accounts of the Division will be on a double entry, cost, and budget basis.

The accounting classification (Figure 71) under which the records of the Division are maintained, conforms to the classification established by the committee on uniform accounting of the American Association of State Highway Officials.

The accounting section of the Bureau of Audits is under the immediate control of the Assistant Chief Clerk, who acts as Chief Accountant.

For administrative purposes the section is divided into four subsections as follows:

1. Accounts and Finances.
2. Costs and Statistics.
3. Construction Disbursements.
4. Maintenance Disbursements.

The Accounts and Finance Section handles the general ledgers, subsidiary ledgers, budget, and voucher registers of the Division.

The section furnishes a summarization of receipts and disbursements of the Division of Highways according to funds, appropriations, functions, and organization units, and provides control accounts against which the cost and statistical records are balanced.

The information collected by this section also furnishes a means of financial control over the affairs of the Division, whereby it becomes possible to measure obligations against funds and appropriations, thus insuring that the Division lives within its income.

The Cost and Statistical Section deals with the collection and dissemination of statistics and cost of work built or performed by the various units of the Division of Highways, whereby it becomes possible to obtain a comparison of results accomplished with moneys expended.

An electric tabulating machine outfit was recently installed for the purpose of handling this work mechanically and more expeditiously; also in greater variety and detail than would be possible by manual means.

This equipment is now in the process of operation, and will make possible the handling of a much larger volume of statistics and cost information in greater detail and with less work.

There is an unusually great demand for statistical and cost information from this Bureau, not only on the part of the State administration and the public of Illinois, but also from many other states, foreign countries, corporations, companies, and individuals; therefore, it is highly important that statistical and cost information be available when requested.

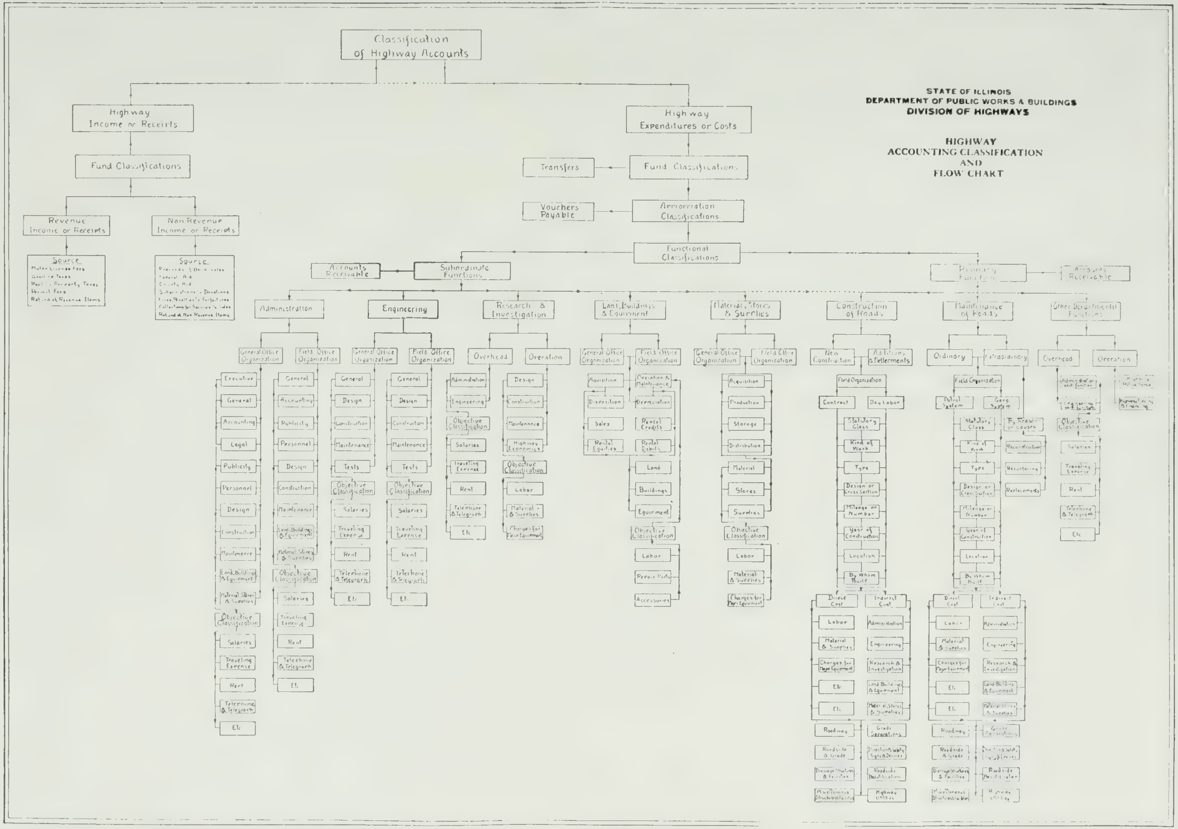
STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
HIGHWAY
ACCOUNTING CLASSIFICATION
AND
FLOW CHART
Classification of Highway Accounts
Highway Income or Receipts
Fund Classifications
Revenue Income or Receipts
Source
Motor License Fees
Gasoline Taxes
Real & Property Taxes
Permit Fees
Refund of Revenue Items
Non-Revenue Income or Receipts
Source
Proceeds of Bond Sales
Federal Aid
County Aid
Subscriptions & Donations
Fines, Penalties & Forfeitures
Collections for Services & Sales
Refund of Non Revenue Items
Highway Expenditures or Costs
Transfers
Fund Classifications
Vouchers Payable
Appropriation Classifications
Functional Classifications
Accounts Receivable
Subordinate Functions
Primary Functions
Accounts Receivable
Administration
General Office Organization
Executive
General
Accounting
Legal
Publicity
Personnel
Design
Construction
Maintenance
Land, Buildings & Equipment
Material, Stores & Supplies
Objective Classification
Salaries
Traveling Expense
Rent
Telephone & Telegraph
Etc
Field Office Organization
General
Accounting
Publicity
Personnel
Design
Construction
Maintenance
Land, Buildings & Equipment
Material, Stores & Supplies
Objective Classification
Salaries
Traveling Expense
Rent
Telephone & Telegraph
Etc
Engineering
General Office Organization
General
Design
Construction
Maintenance
Tests
Objective Classification
Salaries
Traveling Expense
Rent
Telephone & Telegraph
Etc
Field Office Organization
General
Design
Construction
Maintenance
Tests
Objective Classification
Salaries
Traveling Expense
Rent
Telephone & Telegraph
Etc
Research & Investigation
Overhead
Administration
Engineering
Objective Classification
Salaries
Traveling Expense
Rent
Telephone & Telegraph
Etc
Operation
Design
Construction
Maintenance
Highway Economics
Objective Classification
Labor
Material & Supplies
Charges for Major Equipment
Land, Buildings & Equipment
General Office Organization
Field Office Organization
Aquisition
Disposition
Sales
Rental Equities
Operation & Maintenance
Depreciation
Rental Credits
Rental Debits
Land
Buildings
Equipment
Objective Classification
Labor
Repair Parts
Accessories
Material, Stores & Supplies
General Office Organization
Field Office Organization
Acquisition
Production
Storage
Distribution
Material
Stores
Supplies
Objective Classification
Labor
Material & Supplies
Charges for Major Equipment
Construction of Roads
New Construction
Additions & Betterments
Field Organization
Contract
Day Labor
Statutory Class
Kind of Work
Type
Design or Cross Section
Mileage or Number
Year of Construction
Location
By Whom Built
Direct Cost
Labor
Material & Supplies
Charges for Major Equipment
Etc
Etc
Indirect Cost
Administration
Engineering
Research & Investigation
Land Buildings & Equipment
Material Stores & Supplies
Roadway
Roadside & Grade
Drainage Structures & Facilities
Miscellaneous Structures & Facilities
Grade Separations
Direction & Safety Signs & Devices
Roadside Beautification
Highway Utilities
Maintenance of Roads
Ordinary
Extraordinary
Field Organization
Patrol System
Gang System
Statutory Class
Kind of Work
Type
Design or Cross Section
Mileage or Number
Year of Construction
Location
By Whom Built
By Reasons or Causes
Reconstruction
Resurfacing
Replacements
Direct Cost
Labor
Material & Supplies
Charges for Major Equipment
Etc
Etc
Indirect Cost
Administration
Engineering
Research & Investigation
Land Building & Equipment
Material Stores & Supplies
Roadway
Roadside & Grade
Drainage Structures & Facilities
Miscellaneous Structures & Facilities
Grade Separations
Direction & Safety Signs & Devices
Roadside Beautification
Highway Utilities
Other Departmental Functions
Overhead
Administration of each function
Engineering each function
Objective Classification
Salaries
Traveling Expense
Rent
Telephone & Telegraph
Etc
Operation
Highway Police Force
Highway Planning & Mapping

Figure 71.

The information prepared and furnished by this section in regard to the fiscal and financial affairs of the Division of Highways is an aid to the Chief Highway Engineer in the successful management of the affairs of the Division.

The Construction Disbursement Section deals with the checking and payment of payrolls, expense accounts, miscellaneous bills, engineers' payment estimates, etc., and handles the requisitions for equipment, supplies, and materials needed by the various bureaus and construction forces of the Division of Highways.

It also receives, answers, records, handles and files a large volume of correspondence relating to claims, liens, and assignments filed against contractors, where parties are unable to secure settlement direct.

A detailed record of such claims against each contractor for each section of work under contract is kept on file, and arrangements are made for taking care of such claims or assignments before settlements are made with contractors.

This section also handles the accounting for cement furnished by the State to the various road contracts. During 1929 the State contracted for a total of 3,000,000 barrels of cement, of which 2,154,162½ barrels were shipped to the various construction sites throughout the State.

It handled 22,826 vouchers totaling $29,029,700.72 during 1929 relating to the construction and administration and engineering work of the Division.

The Maintenance Disbursement Section deals with the checking and payment of payrolls, expense accounts, and miscellaneous bills relating to work done by the maintenance forces of the various districts, as well as by the Bureau of Maintenance, and the State Highway Maintenance Police organization.

This section handles the requisitions for all equipment, supplies, and materials which are used by either the maintenance forces or the police organization, and keeps the bank accounts which are maintained for the purpose of paying laborers promptly who are employed on an hourly basis to assist in maintenance work.

During 1929 there were 34,919 vouchers, totaling $3,257,131.14 handled through this section.

4. BLUEPRINTING AND SUPPLY SECTION.—The blueprinting and supply section of the Bureau was not quite so active during 1929 as during the previous year, the following being the work handled by this section:

a. Blueprinting.—64,902 blue prints were prepared by this section, covering a total mileage of 190.75 miles of paving, and 64.41 miles of grading, in addition to 2,020 bridge and culvert plans prepared by the bridge section of the Bureau of Design.

Blueprint paper was purchased in quantity lots and considerable saving in time and money results to the Division annually from the operation of this section.

b. Mimeographing.—The use of the mimeograph reduces the printing and typing expense of the Division, and the amount saved during 1929 may be judged by the fact that approximately 335,000 sheets of mimeograph paper were used for letting notices, reports, forms, etc.

c. Addressographing.—All letting notices, bulletins, pamphlets, and other literature published by the Division are proof read, addressed for mailing, and distributed by this section. The use of the addressograph facilitates the handling of this work, and at the present time we have 3,949 names appearing on the mailing list of the Division, consisting principally of the names and addresses of paving, grading, and bridge contractors, highway material producers, dealers, cement companies, county superintendents of highways, other State highway departments, etc.

d. Supplies.—All printing, office, and engineering supplies used by the various districts and bureau offices are requested through this Bureau and are received, checked, stored, and distributed by the supply section.

Bulletins, pamphlets, stationery, forms, etc., are requisitioned through the Division of Printing where they are filled under State contract. Office and engineering supplies are requisitioned through the Division of Purchases and Supplies.

This system of purchasing and checking the supplies results in a large annual saving to the Division of Highways, and prevents overstocking and waste.

5. CENTRAL AND STORAGE FILES SECTION.—All correspondence, records, reports, etc., pertaining to the affairs of the Division of Highways, must be safeguarded and filed in such a manner that they are readily accessible at all times. Fireproof and air-tight sectional files are used for this work and this activity is carried on by or under the direction of the Central and Storage Files Section of the Bureau of Audits. The system used for this work follows:

All correspondence pertaining to particular routes, sections or projects, right-of-way agreements, subways and overheads, and other matters pertaining to the design of pavements or bridges, before they are placed in line of construction, are filed alphabetically, chronologically and by route, section or project under the design section of the active files. When the contracts are awarded for a section or project, that file is placed in the active construction section where it remains until the construction work is completed and the final estimate is issued. Upon issuance of final estimates, the material is placed in the storage section.

A general file is used for all correspondence, etc., not directly related to any particular route, section or project, such as the executive correspondence with the Governor, Attorney General and other State officials; specifications; bonds; and material concerning design, surveys, construction methods, materials, supplies and equipment; maps; highway machinery; circular letters outlining the policies of the department; correspondence regarding cement contracts; correspondence with other State highway departments; resolutions from the various counties; etc.

All correspondence, records, etc., from the various officers of the Division are transferred to the central storage files as soon as they are considered inactive. The material is filed in these files by route, section or project, or in a miscellaneous or general section.

A fair idea of the volume of work done by this section may be gained by a consideration of the extensive construction programs which have been carried on by the Division of Highways in recent years.

6. STATEMENTS, CHARTS, AND STATISTICS.—

The statements, graphic charts and statistics enumerated below, relate to the financial work of this Bureau and show the road and bridge revenues and appropriations, the expenditures which have been made and the balances on December 31, 1929. They also show the statistics relating to the retirement of both the $60,000,000 and $100,000,000 bond issues.

a. Combined Revenues, Expenditures and Balances.—The division of revenues by funds, 1911 to 1929, inclusive (Figure 72). The division of the combined expenditures from the road fund, $60,000,000 Bond Issue Fund and $100,000,000 Bond Issue Fund, 1914 to 1929, inclusive (Figure 73). The combined expenditures from the road fund, $60,000,000 and $100,000,000 Bond Issue Funds and General Revenue Fund and Motor Fuel Tax Fund appropriations, from 1913 to 1929, inclusive (Table 53). The balances, receipts and expenditures for all funds combined for the calendar year 1929 (Table 54).

Table 55 shows the combined revenue and expenditures for all funds for the calendar year 1929.

b. Combined Bond Tables and Statistics.—The amount of principal and interest payable each year on all series of the $60,000,000 Bond Issue and on $98,000,000 of the $100,000,000 Bond Issue sold to December 31, 1929 (Table 56 and Figure 74). The amount of principal due at each retirement period on the entire $60,000,000 Bond Issue plus $98,000,000 of the $100,000,000 Bond Issue sold to December 31, 1929 (Table 57). The amount of interest due at each interest paying period of the entire $60,000,000 Bond Issue plus $98,000,000 of the $100,000,000 Bond Issue sold to December 31, 1929 (Table 58).

c. Road Fund Statistics.—The road fund is made up of Federal aid funds received from the U. S. government, motor license fee receipts and miscellaneous collections such as the accrued interest on bonds sold and the collections of the Division of Highways. This fund is used for the retirement of the principal and payment of interest on outstanding highway bonds of both the $60,000,000 and $100,000,000 Bond Issues, for the payment for maintenance work on the $60,000,000 and $100,000,000 Bond Issue Systems and for maintaining such State aid roads as the State is responsible for, and for the payment of special appropriations which are made by the General Assembly from these revenues. The surplus remaining in the road fund is used for new construction work on the State Bond Issue Systems.

(1) Road Fund Revenues and Sources from Which They Were Collected.

(a) *Federal Aid Allotments.*—A statement of the Federal Aid Funds allotted by the U. S. Government for highway work in Illinois for the fiscal years 1917 to 1931, inclusive (Table 59).

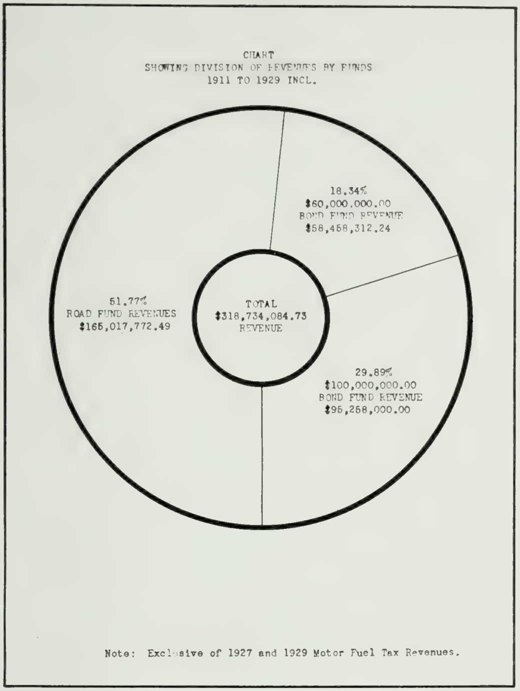

Figure 72.

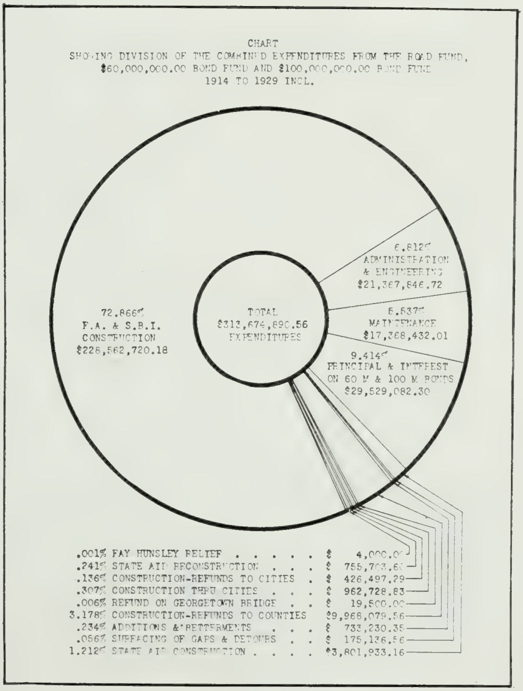

Figure 73.

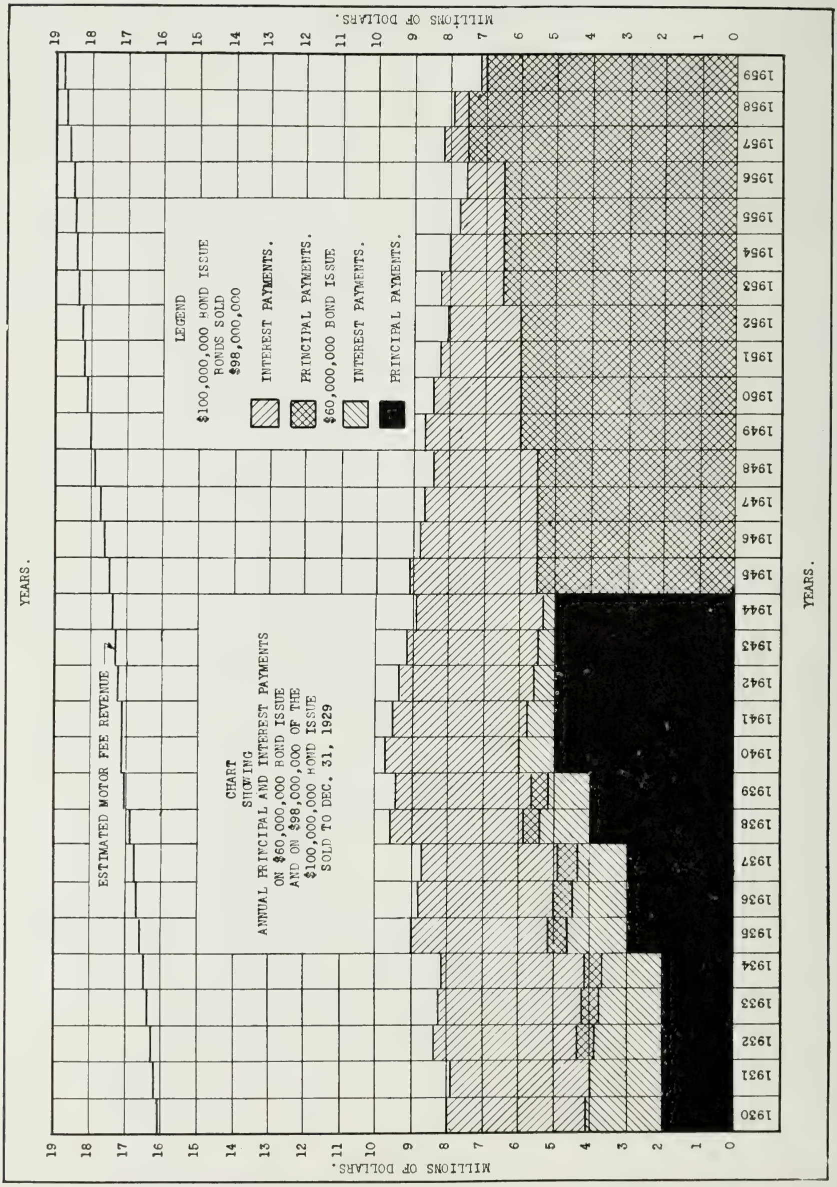

CHART
SHOWING
ANNUAL PRINCIPAL AND INTEREST PAYMENTS
ON $60,000,000 BOND ISSUE
AND ON $98,000,000 OF THE
$100,000,000 BOND ISSUE
SOLD TO DEC. 31, 1929

Figure 74.

(b) *Motor License Fees.*—A statement showing the motor license fees collected by the Secretary of State and the number of vehicles from which such collections were made during the calendar years 1911 to 1929, inclusive (Table 60). The motor license fees collected each month during the calendar years 1926, 1927, 1928 and 1929 (Table 61). The motor license fees collected in each county during the calendar years 1926, 1927, 1928 and 1929 (Table 62).

(c) *Miscellaneous Collections.*—All moneys or funds accruing to any Bureau of the Division are forwarded to this Bureau where a register is kept of same and deposits are prepared and forwarded to the State Treasurer. These records are audited semi-annually by the State Auditor of Public Accounts. The collections of the Division of Highways and the sources from which collected during the calendar year 1929 (Table 63).

(2) Road Funds Deposited in State Treasury.—The road fund revenue deposited in the State treasury each month during the calendar year 1929 (Table 64). The road fund revenue deposited in the State treasury each year from 1911 to 1929, inclusive (Table 65 and Figure 75).

(3) Road Fund Appropriations. — The appropriations payable from the road fund from 1913 to 1929, inclusive (Table 66).

(4) Road Fund Expenditures.—The various expenditures from the road fund from 1914 to 1929, inclusive (Table 67 and Figure 76).

(5) Road Fund Receipts, Expenditures and Balances.—The road fund receipts, expenditures and balances for each month during 1929 (Table 68).

(d) *Sixty Million Dollar Bond Issue Statistics.*—The $60,000,000 Bond Fund was derived from the sale of the $60,000,000 Bond Issue and has been used entirely for construction on the system of durable hard-surfaced roads provided for in the provisions of the $60,000,000 Bond Issue Act of 1918.

(1) Retirement and Interest Calculations.—The arrangement of the retirement of the principal and payment of the interest on all series of the $60,000,000 Bond Issue which was voted November 4, 1918 (Tables 69 to 78, inclusive).

(2) Bond Fund Revenue Deposited in State Treasury.—The Bond Fund revenue derived from the sale of the $60,000,000 Bond Issue, deposited in the State Treasury (Table 79). The proceeds of sales of the $60,000,000 Bond Issue together with the amounts sold, arranged by years from 1921 to 1924, inclusive (Figure 77).

(3) Appropriations.—The appropriations made by the General Assembly from the $60,000,000 Bond Issue Fund (Table 80).

(4) Expenditures.—The division of the expenditures which have been made from the fund derived from the sale of the $60,000,000 Bond Issue for the calendar years 1921 to 1924, inclusive (Table 81 and Figure 78).

(e) *One Hundred Million Dollar Bond Issue Statistics.*—The $100,000,000 Bond Issue Fund is derived from the proceeds of the sale

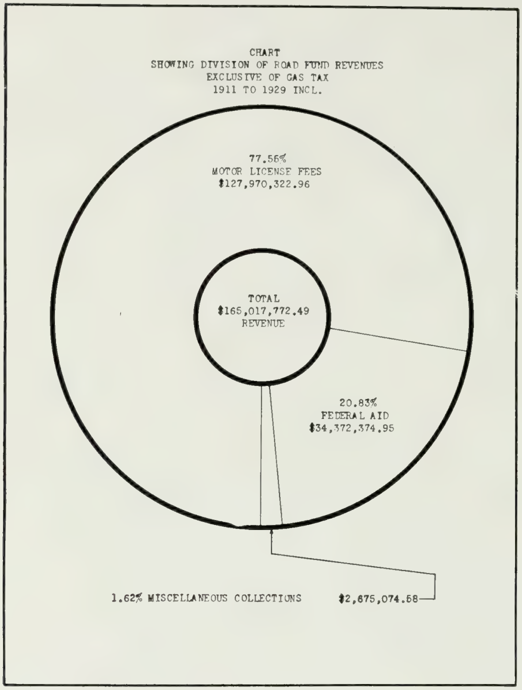

Figure 75.

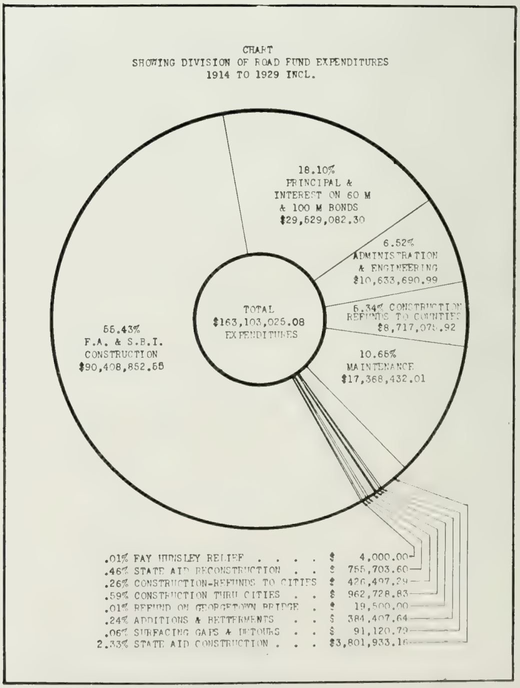

Figure 76.

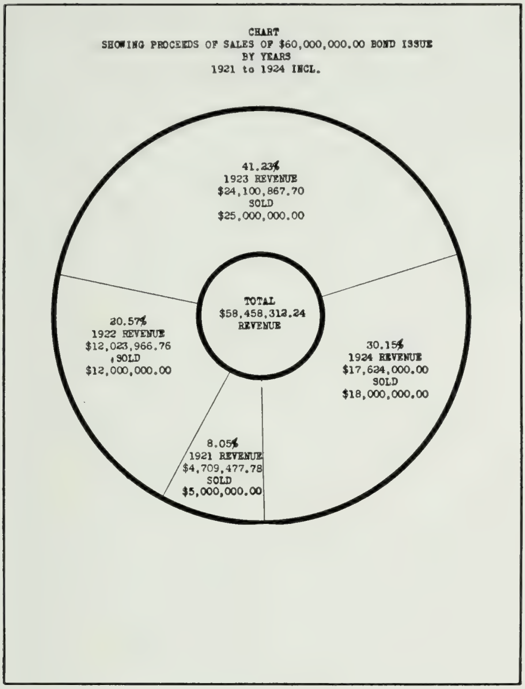

Figure 77.

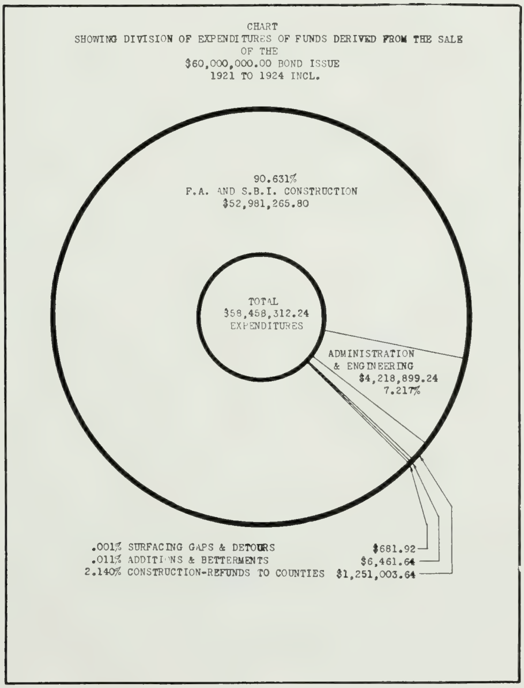

Figure 78.

of the $100,000,000 Bond Issue and is used entirely for construction on the State-wide System of durable hard-surfaced roads provided for in the provisions of the $60,000,000 Bond Issue Act and the $100,000,000 Bond Issue Act which was voted November 4, 1924.

(1) Retirement and Interest Calculations.—The arrangement of the retirement of the principal and payment of the interest on all series of $98,000,000 of the $100,000,000 Bond Issue sold to December 31, 1929 (Tables 82 to 94, inclusive).

(2) Bond Fund Revenue Deposited in State Treasury.—The Bond Fund revenue derived from the sale of $98,000,000 of the $100,000,000 Bond Issue sold to December 31, 1929, deposited in the State Treasury (Table 95 and Figure 79).

(3) Appropriations.—The appropriations made by the General Assembly from the $100,000,000 Bond Issue Fund to December 31, 1929 (Table 96).

(4) Expenditures.—The division of the expenditures which have been made from the fund derived from the sale of $98,000,000 of the $100,000,000 Bond Issue, 1925 to 1929, inclusive (Table 97 and Figure 80).

(5) Receipts, Expenditures and Balances.—The receipts, expenditures and balances by months from the $100,000,000 Bond Issue Fund for the calendar year 1929 (Table 98).

(f) *General Revenue Fund Statistics.*—The general revenue fund is derived from general tax levies made for State purposes and is used only in such cases where special appropriations are made by the General Assembly for special construction, either on or off of $60,000,000 and $100,000,000 Bond Issue Routes.

(1) Appropriations.—The appropriations payable from the general revenue fund as made by the Fifty-fourth, Fifty-fifth, and Fifty-sixth General Assemblies (Table 99).

(2) Expenditures.—The expenditures from the Fifty-fifth and Fifty-sixth General Assembly revenue fund appropriations during the calendar year 1929 (Table 100).

(3) Receipts and Expenditures.—The receipts and expenditures from the general revenue fund on account of special construction payable from such revenue by special appropriation during the calendar year 1929 (Table 101).

(g) *Motor Fuel Tax Fund Statistics.*—The motor fuel tax fund revenue is derived from a three cent per gallon gasoline tax of which the State will receive the benefit of two cents per gallon and the counties the remainder, after the costs of administering the act and refunds to non-motor vehicle users have been deducted (Table 102). The law was enacted by the Fifty-sixth General Assembly as the Motor Fuel Tax Act.

(1) Appropriations.—The appropriations payable from the motor fuel tax fund as made by the Fifty-sixth General Assembly (Table 103).

(2) Expenditures.—The expenditures from the Fifty-sixth General Assembly motor fuel tax appropriations from August 1, 1929 (date the law became effective) to December 31, 1929 (Table 104).

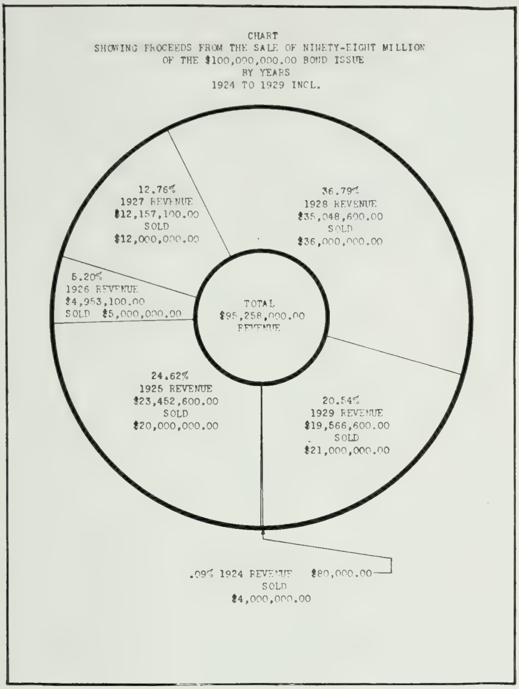

Figure 79.

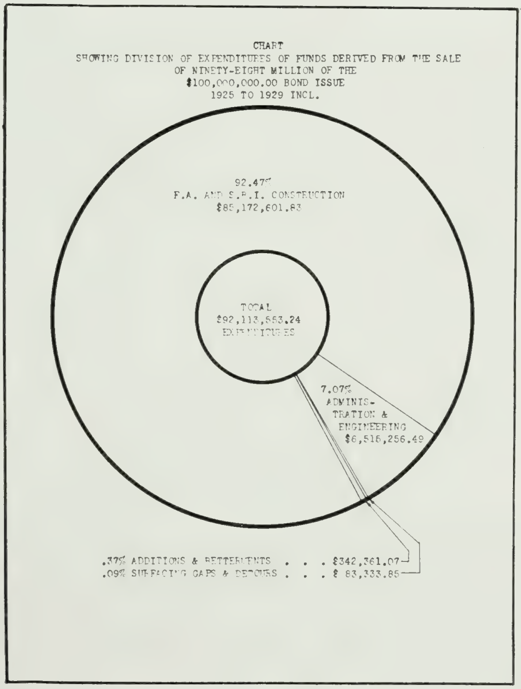

Figure 80.

(h) *General and Miscellaneous Statistics.*—

(1) Refunds to Counties, Townships, Road Districts, and Municipalities.—The $60,000,000 and $100,000,000 State Bond Issue Acts provide that certain refunds be made to counties for improved roads utilized and made a part of the State-wide system. Subsequent action by the General Assembly provides that certain refunds be made to municipalities for city pavements constructed to connect bond issue roads built to the corporate limits. The status of these refunds will be found in the report of the Road Section of the Bureau of Design. A list of the tables showing the appropriations for these refunds and the amounts refunded follows:

(a) *Refunds to Counties.*—Statement showing the amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, House Bill 766, Fifty-second General Assembly (Table 105). Statement showing the amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, House Bill 867, Fifty-second General Assembly (Table 106). Statement showing the amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, House Bill 822, Fifty-third General Assembly (Table 107). Statement showing amounts appropriated for refunds to counties for their share of cost of sections incorporated in the State Bond Issue System, Senate Bill 515, Fifty-fourth General Assembly (Table 108). Statement showing amounts refunded to counties for their share of cost of sections incorporated in the State Bond Issue System from appropriation of $3,000,000, Senate Bill 395, Fifty-fifth General Assembly (Table 109). Statement showing amounts refunded to counties for their share of cost of sections incorporated in the State Bond Issue System from appropriation of $2,500,000, Senate Bill 311, Fifty-sixth General Assembly (Table 110). A combined statement showing the amount refunded to each county under each appropriation bill for the cost of sections incorporated in the State Bond Issue System to December 31, 1929 (Table 111).

(b) *Refunds to Municipalities.*—The total refunds to municipalities from July 1, 1925 to September 30, 1929, at which time the appropriation lapsed (Table 112).

TABLE 53—SUMMARY OF YEARLY EXPENDITURES—1913 TO 1929 INCLUSIVE; ROAD FUND, $60,000,000.00 AND $100,000,000.00 BOND FUNDS, GENERAL REVENUE FUND, AND MOTOR FUEL TAX FUND APPROPRIATIONS.

Year.	Administration and engineering.	State Aid construction.	State Aid reconstruction.	Federal Aid and S. B. I. construction.	Surfacing of gaps and detours.
1913					
1914		$364,202.39			
1915	22,128.34	630,612.30			
1916	3,920.88	656,641.05			
1917	113,318.90	992,754.54			
1918	21,896.36	334,224.06		190,578.78	
1919	568,099.29	441,060.76		3,882,213.47	
1920	1,054,178.76	209,286.41		10,109,977.55	
Sub-total	$1,783,542.53	$3,628,781.51		$14,182,769.80	
1921	$1,230,848.91	$115,104.51		$13,163,408.43	
1922	1,734,496.93	32,768.68		17,523,817.93	
1923	2,285,735.31	25,278.46		25,556,276.09	
1924	2,821,100.23		$ 619.92	33,360,724.25	$16,551.90
1925	2,558,791.64		263.24	28,201,616.10	58,450.82
1926	1,983,703.68		20,021.35	13,318,292.35	42,895.71
1927	2,142,176.97		491,897.15	18,176,611.12	34,200.04
1928	2,699,592.47		210,771.36	39,430,996.56	20,568.76
1929	2,127,858.05		32,130.58	25,648,207.55	2,469.33
Sub-total	$19,584,304.19	$173,151.65	$755,703.60	$214,379,950.38	$175,136.56
Total	$21,367,846.72	$3,801,933.16	$755,703.60	$228,562,720.18	$175,136.56

TABLE 53—Continued.

Year.	Additions and betterments.	Maintenance.	Refunds to counties.	Refund on Georgetown Bridge.
1913				
1914				
1915		$ 14,657.73		
1916		17,125.25		
1917		34,307.21		
1918		37,303.98		
1919		84,614.37		
1920		208,802.55		
Sub-total		$396,811.09		
1921		$ 358,658.85	$ 727,273.18	
1922		640,503.01	2,436,005.43	
1923		1,110,034.41	2,016,520.20	
1924	$ 41,585.46	2,044,860.69	1,176,893.14	
1925	113,276.32	1,834,637.74	602,050.80	
1926	87,704.95	2,264,770.58	499,202.93	
1927	157,607.11	2,721,444.45	368,187.25	19,500.00
1928	248,862.50	2,771,710.63	1,540,435.85	
1929	84,194.01	3,225,000.56	601,510.78	
Sub total	$733,230.35	$16,971,620.92	$9,968,079.56	$19,500.00
Total	$733,230.35	$17,368,432.01	$9,968,079.56	$19,500.00

TABLE 53—Continued.

Year.	Fay Hunsley relief.	Interest and principal on $60,000,000.00 and $100,000,000.00 bonds.	Construction through municipalities.	Refunds to municipalities.
1913				
1914				
1915				
1916				
1917				
1918				
1919				
1920				
Sub-total				
1921	$4,000.00			
1922		$ 96,120.00		
1923		661,340.00		
1924		1,388,813.35		
1925		2,687,303.72	19,592.59	
1926		5,510,843.18	538,374.33	
1927		5,606,009.75	325,859.68	$210,864.06
1928		6,149,016.11	13,300.39	89,795.19
1929		7,429,636.19	65,601.84	125,838.04
Sub-total	$4,000.00	$29,529,082.30	$962,728.83	$426,497.29
Total	$4,000.00	$29,529,082.30	$962,728.83	$426,497.29

TABLE 53—Continued.

Year.	Fair Grounds to Biological Laboratory Road.	Banner to Copperas Creek Road.	Soldiers' Widows' Home Road.	Bridge at Pekin.
1913	$5,348.67			
1914	2,149.66			
1915				
1916				
1917				
1918				
1919				
1920				
Sub-total	$7,498.33			
1921				
1922				
1923				
1924				
1925				
1926		$ 4,863.73		
1927		15,544.01	$19,015.43	
1928		20,684.84	4,867.35	$ 91,918.11
1929		11,402.34		216,057.34
Sub-total		$52,494.92	$23,882.78	$307,975.45
Total	$7,498.33	$52,494.92	$23,882.78	$307,975.45

TABLE 53—Continued.

Year.	To connect roads with bond routes.	Construction of drives and walks.	Construction of Carlyle Bridge.	Mechanical, testing, engineering and other services.
1913				
1914				
1915				
1916				
1917				
1918				
1919				
1920				
Sub-total				
1921				
1922				
1923				
1924				
1925				
1926				
1927				
1928	$108,341.19	$70,720.31		
1929	13,997.92	4,279.69	$77,879.48	$6,626.21
Sub-total	$122,339.11	$75,000.00	$77,879.48	$6,626.21
Total	$122,339.11	$75,000.00	$77,879.48	$6,626.21

TABLE 53—Concluded.

Year.	Refund for certain property owners—Lockport.	Refund for certain property owners—Plainfield.	Administration of Motor Fuel Tax Act.	Total.
1913				$ 5,348.67
1914				366,352.05
1915				667,398.37
1916				677,687.18
1917				1,140,380.65
1918				584,003.18
1919				4,975,987.89
1920				11,582,245.27
Sub-total				$19,999,403.26
1921				$15,599,293.88
1922				22,463,711.98
1923				31,655,184.47
1924				40,851,148.94
1925				36,075,982.97
1926				24,270,672.79
1927				30,288,917.02
1928				53,471,581.62
1929	$28,094.70	$15,683.74	$11,141.80	39,727,610.15
Sub-total	$28,094.70	$15,683.74	$11,141.80	$294,404,103.82
Total	$28,094.70	$15,683.74	$11,141.80	$314,403,507.08

TABLE 54—STATEMENT SHOWING BALANCES, RECEIPTS AND EXPENDITURES FOR ALL FUNDS COMBINED FOR THE CALENDAR YEAR 1929.

Month.	Balance at beginning of month.	Receipts during month.	Per cent of total receipts.	Total.
January	$ 3,863,186.25	$ 3,418,148.36	8.04	$ 7,281,334.61
February	5,557,768.11	3,644,241.08	8.56	9,202,009.19
March	8,015,586.85	5,155,046.27	12.12	13,170,633.12
April	10,228,569.02	3,557,592.49	8.37	13,786,161.51
May	12,035,856.92	1,616,110.23	3.80	13,651,967.15
June	7,134,656.01	10,119,021.66	23.79	17,253,677.67
July	12,967,879.48	509,768.68	1.19	13,477,648.16
August	9,009,904.45	909,644.37	2.13	9,919,548.82
September	5,231,530.15	10,581,108.17	24.88	15,812,638.32
October	11,039,251.35	1,142,503.13	2.69	12,181,754.48
November	8,967,508.49	592,384.36	1.40	9,559,892.85
December	6,909,719.99	1,283,092.53	3.03	8,192,812.52
Total	$3,863,186.25	$42,528,661.33	100.00	$46,391,847.58

TABLE 54—Concluded.

Month.	Expenditures during month.	Per cent of total expenditures.	Balance at end of month.
January	$1,723,566.50	4.33	$ 5,557,768.11
February	1,186,422.34	2.99	8,015,586.85
March	2,942,064.10	7.41	10,228,569.02
April	1,750,304.59	4.41	12,035,856.92
May	6,517,311.14	16.40	7,134,656.01
June	4,285,798.19	10.78	12,967,879.48
July	4,467,743.71	11.25	9,009,904.45
August	4,688,018.67	11.80	5,231,530.15
September	4,773,386.97	12.02	11,039,251.35
October	3,214,245.99	8.09	8,967,508.49
November	2,650,172.86	6.67	6,909,719.99
December	1,528,575.09	3.85	6,664,237.43
Total	$39,727,610.16	100.00	$6,664,237.43

TABLE 55—REVENUE AND EXPENDITURE STATEMENT FOR ALL FUNDS DURING THE CALENDAR YEAR 1929.

Account.	Road Fund.	Motor Fuel Tax Fund.	Bond Fund.	General Revenue Fund.	Total—all funds.
1. REVENUES—					
Motor license fees	$17,035,596.03				$17,035,596.03
Federal Aid	3,482,065.67				3,482,065.67
Miscellaneous	393,637.59				393,637.59
Accrued interest	60,555.56				60,555.56
Motor fuel tax receipts		$1,616,185.06			1,616,185.06
Proceeds of bond sales			$19,566,600.00		19,566,600.00
General taxation				$374,021.42	374,021.42
Total revenues received	$20,971,854.85	$1,616,185.06	$19,566,600.00	$374,021.42	$42,528,661.33
Balance in funds Jan. 1, 1929	2,823,906.25		1,039,280.00		3,863,186.25
Total revenues available	$23,795,761.10	$1,616,185.06	$20,605,880.00	$374,021.42	$46,391,847.58
2. EXPENDITURES.					
Road Fund Reserves—					
Construction through cities	$ 65,601.84				$ 65,601.84
Construction of Hardin Bridge					
Construction of Central Garage					
Maintenance of highways	3,257,131.14				3,257,131.14
Principal and interest on bonds	7,429,636.19				7,429,636.19
Refunds to counties, townships and road districts	601,510.78				601,510.78
Refunds to cities	125,838.04				125,838.04
Refund to city of Gillespie					
Total road fund reserve expenditures	$11,479,717.99				$11,479,717.99
B. I. and F. A. Construction—					
Administration and engineering	$1,059,639.49		$ 1,068,218.56		$ 2,127,858.05
Contract construction	8,730,123.66		15,677,883.95		24,408,007.61
Day labor construction	561,355.03		678,844.91		1,240,199.94
Grade separations					
Widening, improving and reconstructing					
Additions and betterments	49,992.22		34,201.79		84,194.01
Surfacing of gaps and detours	185.30		2,284.03		2,469.33
Total B. I. & F. A. construction expenditures	$10,401,295.70		$17,461,433.24		$27,862,728.94

TABLE 55—Concluded.

Account.	Road Fund.	Motor Fuel Tax Fund.	Bond Fund.	General Revenue Fund.	Total—all funds.
Special Construction (Revenue Fund)—					
Construction of Banner to Copperas Creek Road				$ 11,402.34	$ 11,402.34
Construction of Carlyle Bridge				77,879.48	77,879.48
Construction of road to connect bond routes				13,997.92	13,997.92
Construction of drives and walks				4,279.69	4,279.69
Construction of road to entrance Starved Rock Park					
Construction of Mt. Carmel Bridge					
Construction of Pekin Bridge				216,057.34	216,057.34
Mechanical, testing, engineering and other services				6,626.21	6,626.21
Refund for certain property owners—Lockport				28,094.70	28,094.70
Refund for certain property owners—Plainfield				15,683.74	15,683.74
Total special construction expenditures				$374,021.42	$374,021.42
Department of Finance Expenditures—					
Administration of Motor Fuel Tax Act		$11,141.80			$11,141.80
Allotments paid to counties					
Refunds to non-motor vehicle users					
Total Department of Finance expenditures		$11,141.80			$11,141.80
Grand total expenditures	$21,881,013.69	$11,141.80	$17,461,433.24	$374,021.42	$39,727,610.15
3. BALANCE IN FUNDS—January 1, 1930	$1,914,747.41	$1,605,043.26	$3,144,446.76		$6,664,237.43

TABLE 56—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF THE $60,000,000 AND ON $98,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1929.

Year in which principal is to be retired and interest paid.	Principal of $60,000,000 bonds to be retired each year.	Principal of $100,000,000 bonds to be retired each year.	Total principal both bond issues to be retired each year.	Interest on $60,000,000 bonds to be paid each year.	Interest on $100,000,000 bonds to be paid each year.	Total interest on both bond issues to be paid each year.	Total principal and interest both bond issues to be paid each year.
1930	$2,000,000.00		$2,000,000.00	$2,080,000.00	$3,920,000.00	$6,000,000.00	$8,000,000.00
1931	2,000,000.00		2,000,000.00	2,000,000.00	3,920,000.00	5,920,000.00	7,920,000.00
1932	2,000,000.00	$ 500,000.00	2,500,000.00	1,920,000.00	3,910,000.00	5,830,000.00	8,330,000.00
1933	2,000,000.00	500,000.00	2,500,000.00	1,840,000.00	3,890,000.00	5,730,000.00	8,230,000.00
1934	2,000,000.00	500,000.00	2,500,000.00	1,760,000.00	3,870,000.00	5,630,000.00	8,130,000.00
1935	3,000,000.00	500,000.00	3,500,000.00	1,680,000.00	3,850,000.00	5,530,000.00	9,030,000.00
1936	3,000,000.00	500,000.00	3,500,000.00	1,560,000.00	3,830,000.00	5,390,000.00	8,890,000.00
1937	3,000,000.00	500,000.00	3,500,000.00	1,440,000.00	3,810,000.00	5,250,000.00	8,750,000.00
1938	4,000,000.00	500,000.00	4,500,000.00	1,320,000.00	3,790,000.00	5,110,000.00	9,610,000.00
1939	4,000,000.00	500,000.00	4,500,000.00	1,160,000.00	3,770,000.00	4,930,000.00	9,430,000.00
1940	5,000,000.00		5,000,000.00	1,000,000.00	3,760,000.00	4,760,000.00	9,760,000.00
1941	5,000,000.00		5,000,000.00	800,000.00	3,760,000.00	4,560,000.00	9,560,000.00
1942	5,000,000.00		5,000,000.00	600,000.00	3,760,000.00	4,360,000.00	9,360,000.00
1943	5,000,000.00		5,000,000.00	400,000.00	3,760,000.00	4,160,000.00	9,160,000.00
1944	5,000,000.00		5,000,000.00	200,000.00	3,760,000.00	3,960,000.00	8,960,000.00
1945		5,500,000.00	5,500,000.00		3,650,000.00	3,650,000.00	9,150,000.00
1946		5,500,000.00	5,500,000.00		3,430,000.00	3,430,000.00	8,930,000.00
1947		5,500,000.00	5,500,000.00		3,210,000.00	3,210,000.00	8,710,000.00
1948		5,500,000.00	5,500,000.00		2,990,000.00	2,990,000.00	8,490,000.00
1949		6,000,000.00	6,000,000.00		2,760,000.00	2,760,000.00	8,760,000.00
1950		6,000,000.00	6,000,000.00		2,520,000.00	2,520,000.00	8,520,000.00
1951		6,000,000.00	6,000,000.00		2,280,000.00	2,280,000.00	8,280,000.00
1952		6,000,000.00	6,000,000.00		2,040,000.00	2,040,000.00	8,040,000.00
1953		6,500,000.00	6,500,000.00		1,790,000.00	1,790,000.00	8,290,000.00
1854		6,500,000.00	6,500,000.00		1,530,000.00	1,530,000.00	8,030,000.00
1955		6,500,000.00	6,500,000.00		1,270,000.00	1,270,000.00	7,770,000.00
1956		6,500,000.00	6,500,000.00		1,010,000.00	1,010,000.00	7,510,000.00
1957		7,500,000.00	7,500,000.00		730,000.00	730,000.00	8,230,000.00
1958		7,500,000.00	7,500,000.00		430,000.00	430,000.00	7,930,000.00
1959		7,000,000.00	7,000,000.00		140,000.00	140,000.00	7,140,000.00
Total	$52,000,000.00	$98,000,000.00	$150,000,000.00	$19,760,000.00	$87,140,000.00	$106,900,000.00	$256,900,000.00

TABLE 57—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF PRINCIPAL DUE AT EACH RETIREMENT PERIOD ON THE ENTIRE $60,000,000 BOND ISSUE PLUS $98,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1929.

Year in which principal is to be retired.	Principal $60,000,000 bonds to be retired March 1st each year.	Principal $100,000,000 bonds to be retired March 1st each year.	Total principal both bond issues to be retired March 1st.	Principal $60,000,000 bonds to be retired May 1st each year.	Principal $100,000,000 bonds to be retired May 1st each year.	Total principal both bond issues to be retired May 1st.	Total $60,000,000 bond principal to be retired each year.	Total $100,000,000 bond principal to be retired each year.	Total principal both bond issues to be retired each year.
1930				$2,000,000.00		$2,000,000.00	$2,000,000.00		$2,000,000.00
1931				2,000,000.00		2,000,000.00	2,000,000.00		2,000,000.00
1932				2,000,000.00	$ 500,000.00	2,500,000.00	2,000,000.00	$ 500,000.00	2,500,000.00
1933				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1934				2,000,000.00	500,000.00	2,500,000.00	2,000,000.00	500,000.00	2,500,000.00
1935	$1,000,000.00		$1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1936	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1937	1,000,000.00		1,000,000.00	2,000,000.00	500,000.00	2,500,000.00	3,000,000.00	500,000.00	3,500,000.00
1938	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1939	3,000,000.00		3,000,000.00	1,000,000.00	500,000.00	1,500,000.00	4,000,000.00	500,000.00	4,500,000.00
1940	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1941	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1942	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1943	4,000,000.00		4,000,000.00	1,000,000.00		1,000,000.00	5,000,000.00		5,000,000.00
1944	5,000,000.00		5,000,000.00				5,000,000.00		5,000,000.00
1945		$2,500,000.00	2,500,000.00		3,000,000.00	3,000,000.00		5,500,000.00	5,500,000.00
1946		2,500,000.00	2,500,000.00		3,000,000.00	3,000,000.00		5,500,000.00	5,500,000.00
1947		2,500,000.00	2,500,000.00		3,000,000.00	3,000,000.00		5,500,000.00	5,500,000.00
1948		2,500,000.00	2,500,000.00		3,000,000.00	3,000,000.00		5,500,000.00	5,500,000.00
1949		3,000,000.00	3,000,000.00		3,000,000.00	3,000,000.00		6,000,000.00	6,000,000.00
1950		3,000,000.00	3,000,000.00		3,000,000.00	3,000,000.00		6,000,000.00	6,000,000.00
1951		3,000,000.00	3,000,000.00		3,000,000.00	3,000,000.00		6,000,000.00	6,000,000.00
1952		3,000,000.00	3,000,000.00		3,000,000.00	3,000,000.00		6,000,000.00	6,000,000.00
1953		3,000,000.00	3,000,000.00		3,500,000.00	3,500,000.00		6,500,000.00	6,500,000.00
1954		3,000,000.00	3,000,000.00		3,500,000.00	3,500,000.00		6,500,000.00	6,500,000.00
1955		2,500,000.00	2,500,000.00		4,000,000.00	4,000,000.00		6,500,000.00	6,500,000.00
1956		2,500,000.00	2,500,000.00		4,000,000.00	4,000,000.00		6,500,000.00	6,500,000.00
1957		3,500,000.00	3,500,000.00		4,000,000.00	4,000,000.00		7,500,000.00	7,500,000.00
1958		3,500,000.00	3,500,000.00		4,000,000.00	4,000,000.00		7,500,000.00	7,500,000.00
1959		3,000,000.00	3,000,000.00		4,000,000.00	4,000,000.00		7,000,000.00	7,000,000.00
Total	$30,000,000.00	$43,000,000.00	$73,000,000.00	$22,000,000.00	$55,000,000.00	$77,000,000.00	$52,000,000.00	$98,000,000.00	$150,000,000.00

NOTE.—$2,000,000 of the $60,000,000 bond issue was retired during each of the years 1926, 1927, 1928 and 1929.

TABLE 58—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS SHOWING THE AMOUNT OF INTEREST DUE AT EACH INTEREST PAYING PERIOD ON THE ENTIRE $60,000,000 BOND ISSUE PLUS $98,000,000 OF THE $100,000,000 BOND ISSUE SOLD TO DECEMBER 31, 1929.

Year in which interest is to be paid.	Interest on $60,000,000 bonds to be paid March 1st each year.	Interest on $100,000,000 bonds to be paid March 1st each year.	Total interest on both bond issues to be paid March 1st each year.	Interest on $60,000,000 bonds to be paid May 1st each year.	Interest on $100,000,000 bonds to be paid May 1st each year.	Total interest on both bond issues to be paid May 1st each year.	Interest on $100,000,000 bonds to be paid Sept. 1st each year.	Interest on $100,000,000 bonds to be paid Nov. 1st each year.	Total interest on $60,000,000 bond issue to be paid each year.	Total interest on $100,000,000 bond issue to be paid each year.	Total interest on both bond issues to be paid each year.
1930	$1,200,000.00	$860,000.00	$2,060,000.00	$880,000.00	$1,100,000.00	$1,980,000.00	$860,000.00	$1,100,000.00	$2,080,000.00	$3,920,000.00	$6,000,000.00
1931	1,200,000.00	860,000.00	2,060,000.00	800,000.00	1,100,000.00	1,900,000.00	860,000.00	1,100,000.00	2,000,000.00	3,920,000.00	5,920,000.00
1932	1,200,000.00	860,000.00	2,060,000.00	720,000.00	1,100,000.00	1,820,000.00	860,000.00	1,090,000.00	1,920,000.00	3,910,000.00	5,830,000.00
1933	1,200,000.00	860,000.00	2,060,000.00	640,000.00	1,090,000.00	1,730,000.00	860,000.00	1,080,000.00	1,840,000.00	3,890,000.00	5,730,000.00
1934	1,200,000.00	860,000.00	2,060,000.00	560,000.00	1,080,000.00	1,640,000.00	860,000.00	1,070,000.00	1,760,000.00	3,870,000.00	5,630,000.00
1935	1,200,000.00	860,000.00	2,060,000.00	480,000.00	1,070,000.00	1,550,000.00	860,000.00	1,060,000.00	1,680,000.00	3,850,000.00	5,530,000.00
1936	1,160,000.00	860,000.00	2,020,000.00	400,000.00	1,060,000.00	1,460,000.00	860,000.00	1,050,000.00	1,560,000.00	3,830,000.00	5,390,000.00
1937	1,120,000.00	860,000.00	1,980,000.00	320,000.00	1,050,000.00	1,370,000.00	860,000.00	1,040,000.00	1,440,000.00	3,810,000.00	5,250,000.00
1938	1,080,000.00	860,000.00	1,940,000.00	240,000.00	1,040,000.00	1,280,000.00	860,000.00	1,030,000.00	1,320,000.00	3,790,000.00	5,110,000.00
1939	960,000.00	860,000.00	1,820,000.00	200,000.00	1,030,000.00	1,230,000.00	860,000.00	1,020,000.00	1,160,000.00	3,770,000.00	4,930,000.00
1940	840,000.00	860,000.00	1,700,000.00	160,000.00	1,020,000.00	1,180,000.00	860,000.00	1,020,000.00	1,000,000.00	3,760,000.00	4,760,000.00
1941	680,000.00	860,000.00	1,540,000.00	120,000.00	1,020,000.00	1,140,000.00	860,000.00	1,020,000.00	800,000.00	3,760,000.00	4,560,000.00
1942	520,000.00	860,000.00	1,380,000.00	80,000.00	1,020,000.00	1,100,000.00	860,000.00	1,020,000.00	600,000.00	3,760,000.00	4,360,000.00
1943	360,000.00	860,000.00	1,220,000.00	40,000.00	1,020,000.00	1,060,000.00	860,000.00	1,020,000.00	400,000.00	3,760,000.00	4,160,000.00
1944	200,000.00	860,000.00	1,060,000.00		1,020,000.00	1,020,000.00	860,000.00	1,020,000.00	200,000.00	3,760,000.00	3,960,000.00
1945		860,000.00	860,000.00		1,020,000.00	1,020,000.00	810,000.00	960,000.00		3,650,000.00	3,650,000.00
1946		810,000.00	810,000.00		960,000.00	960,000.00	760,000.00	900,000.00		3,430,000.00	3,430,000.00
1947		760,000.00	760,000.00		900,000.00	900,000.00	710,000.00	840,000.00		3,210,000.00	3,210,000.00
1948		710,000.00	710,000.00		840,000.00	840,000.00	660,000.00	780,000.00		2,990,000.00	2,990,000.00
1949		660,000.00	660,000.00		780,000.00	780,000.00	600,000.00	720,000.00		2,760,000.00	2,760,000.00
1950		600,000.00	600,000.00		720,000.00	720,000.00	540,000.00	660,000.00		2,520,000.00	2,520,000.00
1951		540,000.00	540,000.00		660,000.00	660,000.00	480,000.00	600,000.00		2,280,000.00	2,280,000.00
1952		480,000.00	480,000.00		600,000.00	600,000.00	420,000.00	540,000.00		2,040,000.00	2,040,000.00
1953		420,000.00	420,000.00		540,000.00	540,000.00	360,000.00	470,000.00		1,790,000.00	1,790,000.00
1954		360,000.00	360,000.00		470,000.00	470,000.00	300,000.00	400,000.00		1,530,000.00	1,530,000.00
1955		300,000.00	300,000.00		400,000.00	400,000.00	250,000.00	320,000.00		1,270,000.00	1,270,000.00
1956		250,000.00	250,000.00		320,000.00	320,000.00	200,000.00	240,000.00		1,010,000.00	1,010,000.00
1957		200,000.00	200,000.00		240,000.00	240,000.00	130,000.00	160,000.00		730,000.00	730,000.00
1958		130,000.00	130,000.00		160,000.00	160,000.00	60,000.00	80,000.00		430,000.00	430,000.00
1959		60,000.00	60,000.00		80,000.00	80,000.00				140,000.00	140,000.00
Total	$14,120,000.00	$20,040,000.00	$34,160,000.00	$5,640,000.00	$24,510,000.00	$30,150,000.00	$19,180,000.00	$23,410,000.00	$19,760,000.00	$87,140,000.00	$106,900,000.00

TABLE 59—STATEMENT OF FEDERAL AID FUNDS ALLOTTED BY THE UNITED STATES GOVERNMENT TO ILLINOIS 1917 TO 1931 INCLUSIVE.

	Amount.
Fiscal Year Ending June 30, 1917	$ 220,926.23
Fiscal Year Ending June 30, 1918	441,852.46
Fiscal Year Ending June 30, 1919	2,185,550.65
Fiscal Year Ending June 30, 1919	658,323.48
Fiscal Year Ending June 30, 1920	874,220.26
Fiscal Year Ending June 30, 1920	3,278,325.98
Fiscal Year Ending June 30, 1921	1,091,266.98
Fiscal Year Ending June 30, 1921	3,273,800.93
Fiscal Year Ending June 30, 1922	3,246,281.07
Fiscal Year Ending June 30, 1923	2,164,187.38
Fiscal Year Ending June 30, 1923—Reapportioned	28,611.00
Fiscal Year Ending June 30, 1924	2,797,888.59
Fiscal Year Ending June 30, 1925	3,203,867.99
Fiscal Year Ending June 30, 1926	3,191,479.00
Fiscal Year Ending June 30, 1927	3,175,616.00
Fiscal Year Ending June 30, 1928	3,154,429.00
Fiscal Year Ending June 30, 1929	3,135,225.00
Fiscal Year Ending June 30, 1930	3,118,949.00
Fiscal Year Ending June 30, 1931	3,100,781.00
	$42,341,582.00

TABLE 60—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

Year of collection.	Number of vehicles.	Fees collected.	Average license fee per motor vehicle.
1911	38,269	$ 105,344.28	$ 2.75
1912	68,012	375,716.22	5.52
1913	94,646	507,134.77	5.36
1914	131,140	703,403.70	5.36
1915	180,832	924,905.74	5.11
1916	248,429	1,242,509.85	5.00
1917	340,252	1,587,772.69	4.67
1918	389,761	2,762,567.53	7.09
1919	478,438	3,262,176.57	6.82
1920	568,759	5,893,586.02	10.36
1921	670,389	6.776,781.17	9.94
1922	786.188	7,861.211.21	10.01
1923	973.608	9,630.367.77	9.94
1924	1,128,053	11,513,957.05	8.68
1925	1,267,734	12,936,882.13	10.20
1926	1,375,191	14,047,207.86	10.21
1927	1,443,579	14,839,593.29	10.28
1928	1,508,907	15,521,529.88	10.29
1929	1,619,693	17,087,209.11	10.55
Total 1911 to 1929	13,311,880	$127,579,856.84	$9.58

NOTE—This statement represents the collection of motor fees by calendar years as made by the Secretary of State's office and can not be compared with the revenue deposited with the State Treasurer due to the fact that the law requires the Secretary of State to deposit his collections each thirty days following date of receipt.

TABLE 61—SCHEDULE OF MOTOR FEE RECEIPTS BY SECRETARY OF STATE.

	1926	1927	1928	1929
January	$6,572,605.72	$6,818,923.22	$6,967,951.02	$6,135,574.75
February	2,526,795.92	3,026,301.85	2,730,734.89	3,210,572.75
March	1,757,830.67	2,103,205.27	2,201,635.82	3,838,754.39
April	925,950.19	897,990.62	1,120,161.00	1,402,742.47
May	800,539.64	679,154.38	928,836.35	806,704.19
June	430,240.42	391,463.70	458,913.59	447,090.94
July	434,947.22	384,748.73	436,271.05	511,109.10
August	258,046.32	226,755.11	284,675.54	301,206.67
September	168,085.08	147,037.12	180,227.45	195,787.77
October	102,286.57	95,761.15	134,726.36	144,618.03
November	52,548.86	53,286.00	57,331.26	73,105.08
December	17,331.25	14,966.14	20,065.55	19,942.97
Total	$14,047,207.86	$14,839,593.29	$15,521,529.88	$17,087,209.11

TABLE 62—SCHEDULE OF MOTOR FEES BY COUNTIES, AS COLLECTED BY SECRETARY OF STATE.

	1926	1927	1928	1929
Cook	$5,286,139.00	$5,778,102.00	$6,107,673.88	$6,973,978.00
Adams	152,420.00	163,211.00	165,412.00	178,972.00
Alexander	36,390.00	35,334.00	35,615.00	38,276.00
Bond	36,830.00	36,490.00	37,004.00	39,050.00
Boone	44,010.00	44,666.00	45,116.00	50,268.00
Brown	20,950.00	19,719.00	19,840.00	22,549.00
Bureau	117,520.00	119,830.00	121,012.00	129,529.00
Calhoun	14,752.00	14,773.00	14,913.00	16,888.00
Carroll	56,375.00	58,944.00	60,112.00	63,235.00
Cass	46,990.00	44,378.00	45,989.00	49,523.00
Champaign	187,333.00	189,312.00	195,416.00	211,881.00
Christian	98,844.00	99,700.00	101,753.00	105,645.00
Clark	51,835.00	53,447.00	55,005.00	54,492.00
Clay	35,287.00	34,363.00	35,988.00	37,120.00
Clinton	44,540.00	47,158.00	48,956.00	49,562.00
Coles	89,826.00	92,171.00	96,676.00	102,903.00
Crawford	67,358.00	71,722.00	74,325.00	75,082.00
Cumberland	24,449.00	24,175.00	25,670.00	23,760.00
DeKalb	103,242.00	107,814.00	111,235.00	116,782.00
DeWitt	47,766.00	47,273.00	50,010.00	52,377.00
Douglas	51,035.00	50,771.00	52,115.00	53,968.00
DuPage	191,933.00	221,230.00	233,344.00	274,130.00
Edgar	70,861.00	70,711.00	71,987.00	76,652.00
Edwards	24,144.00	24,790.00	25,954.00	24,797.00
Effingham	46,537.00	48,055.00	49,977.00	52,623.00
Fayette	44,370.00	45,438.00	46,899.00	51,108.00
Ford	49,744.00	49,184.00	51,126.00	54,893.00
Franklin	122,890.00	125,990.00	129,567.00	128,010.00
Fulton	119,871.00	116,588.00	119,822.00	130,210.00
Gallatin	18,930.00	18,405.00	18,906.00	19,690.00
Greene	47,111.00	46,231.00	47,125.00	51,098.00
Grundy	51,643.00	52,109.00	53,961.00	59,268.00
Hamilton	19,945.00	18,980.00	19,101.00	19,945.00
Hancock	81,646.00	79,715.00	84,454.00	88,785.00
Hardin	7,644.00	7,782.00	7,924.00	10,206.00
Henderson	22,477.00	21,241.00	23,600.00	22,393.00
Henry	132,830.00	138,506.00	144,557.00	148,406.00
Iroquois	102,674.00	102,855.00	105,979.00	112,980.00
Jackson	79,011.00	77,890.00	78,990.00	77,180.00
Jasper	29,310.00	28,799.00	29,853.00	30,284.00
Jefferson	61,822.00	61,423.00	64,916.00	65,566.00
Jersey	25,380.00	25,088.00	26,322.00	29,827.00
JoDaviess	58,212.00	61,800.00	64,123.00	62,960.00
Johnson	18,079.00	17,212.00	17,877.00	17,718.00
Kane	296,115.00	320,060.00	345,456.00	368,146.00
Kankakee	114,200.00	119,211.00	125,122.00	134,350.00
Kendall	32,800.00	33,225.00	34,962.00	35,404.00
Knox	135,366.00	137,388.00	141,348.00	157,043.00
Lake	216,760.00	247,950.00	256,432.00	322,067.00
LaSalle	238,399.00	248,831.00	254,455.00	283,845.00
Lawrence	57,500.00	58,209.00	60,405.00	61,538.00
Lee	95,290.00	98,833.00	102,567.00	109,385.00
Livingston	108,964.00	108,366.00	112,134.00	120,615.00

TABLE 62—Concluded.

	1926	1927	1928	1929
Logan	$ 72,866.00	$ 70,827.00	$ 71,996.00	$ 77,809.00
Macon	190,187.00	207,012.00	215,567.00	229,589.00
Macoupin	113,950.00	114,328.00	116,531.00	120,471.00
Madison	282,570.00	302,770.00	313,399.00	353,900.00
Marion	83,693.00	92,601.00	95,005.00	96,240.00
Marshall	35,456.00	34,085.00	35,788.00	36,706.00
Mason	49,670.00	46,890.00	47,854.00	53,545.00
Massac	19,377.00	20,644.00	20,873.00	25,131.00
McDonough	78,900.00	78,633.00	81,645.00	88,261.00
McHenry	109,631.00	119,250.00	124,211.00	126,553.00
McLean	197,611.00	198,342.00	207,432.00	227,975.00
Menard	30,713.00	29,396.00	29,981.00	32,499.00
Mercer	53,722.00	53,089.00	54,774.00	53,478.00
Monroe	32,040.00	33,299.00	34,697.00	37,387.00
Montgomery	87,166.00	86,104.00	88,202.00	91,426.00
Morgan	78,040.00	78,110.00	81,263.00	86,845.00
Moultrie	33,468.00	32,817.00	33,456.00	37,196.00
Ogle	88,940.00	91,180.00	94,185.00	101,605.00
Peoria	303,012.00	318,096.00	333,129.00	365,439.00
Perry	46,566.00	46,592.00	47,974.00	50,953.00
Piatt	46,911.00	48,230.00	49,959.00	54,024.00
Pike	59,683.00	58,425.00	60,128.00	65,110.00
Pope	9,740.00	9,415.00	9,712.00	10,407.00
Pulaski	22,299.00	22,081.00	22,977.00	24,530.00
Putnam	15,390.00	15,200.00	16,178.00	15,971.00
Randolph	60,522.00	62,166.00	64,133.00	69,618.00
Richland	36,591.00	38,130.00	39,213.00	40,995.00
Rock Island	220,141.00	233,691.00	244,676.00	286,106.00
Saline	69,350.00	69,200.00	71,007.00	72,712.00
Sangamon	244,200.00	251,157.00	263,838.00	283,986.00
Schuyler	29,688.00	27,710.00	28,102.00	30,919.00
Scott	24,411.00	23,250.00	23,988.00	24,196.00
Shelby	65,855.00	65,411.00	66,714.00	69,662.00
Stark	33,310.00	31,619.00	32,125.00	33,223.00
St. Clair	301,232.00	326,795.00	340,446.00	379,944.00
Stephenson	112,340.00	119,754.00	123,568.00	117,933.00
Tazewell	96,834.00	100,177.00	103,755.00	118,132.00
Union	36,377.00	36,146.00	37,206.00	38,832.00
Vermilion	208,911.00	212,200.00	223,913.00	230,434.00
Wabash	33,360.00	32,190.00	32,897.00	32,168.00
Warren	73,988.00	71,329.00	72,874.00	76,550.00
Washington	39,142.00	40,212.00	41,677.00	43,941.00
Wayne	36,500.00	35,715.00	36,112.00	36,995.00
White	38,050.00	37,450.00	38,120.00	40,978.00
Whiteside	124,371.00	129,899.00	135,233.00	139,085.00
Will	235,100.00	249,113.00	268,452.00	275,865.00
Williamson	120,401.00	123,621.00	126,644.00	114,590.00
Winnebago	267,950.00	289,970.00	310,122.00	354,777.00
Woodford	60,633.86	59,824.29	60,818.00	65,556.00
Total	$14,047,207.86	$14,839,593.29	$15,521,529.88	$17,087,209.00

TABLE 63—STATEMENT SHOWING COLLECTIONS OF THE DIVISION OF HIGHWAYS AND SOURCES FROM WHICH COLLECTED, JANUARY 1, 1929 TO DECEMBER31, 1929.

Month.	Administration.	Engineering.	Tests.	Construction refunds.	Maintenance refunds.	Equipment rentals and sales.	Total.
January	$3,356.16		$ 210.20	$19,166.88	$ 8,602.66		$31,335.90
February	1,297.99	5.00	133.34	25,240.19	5,577.38	970.07	33,223.97
March	23.52		3,255.92	108.46	1,587.93	208.46	5,184.29
April	378.98	53.22	337.23	64,724.66	8,807.95	305.60	74,607.64
May	13.97	60.00	5,051.39	44,964.66	2,841.17	900.00	53,831.19
June	90.93	317.04	861.96	2,779.34	5,428.53	2,318.94	11,796.74
July	71.82		696.82	29,147.15	2,723.92	1,062.35	33,702.06
August	173.07	16.99	1,515.76	8,378.48	8,287.07	237.82	18,609.19
September	125.99	166.67	904.48	8,006.39	10,145.30	3,914.62	23,263.45
October	72.52		2,968.29	31,104.85	2,059.79	16,797.86	53,003.31
November	31.46	25.75	828.59	6,118.18	7,314.89	5,064.14	19,383.01
December	30.54		239.41	28,399.07	6,010.86	182.17	34,862.05
Total	$5,666.95	$644.67	$17,003.39	$268,138.31	$69,387.45	$31,962.03	$392,802.80

TABLE 64—STATEMENT SHOWING ROAD FUND REVENUE DEPOSITED IN THE STATE TREASURY BY MONTHS DURING THE CALENDAR YEAR 1929.

Month.	Motor license fees.	Per cent of total.	Federal Aid.	Miscellaneous.	Total.	Per cent of total.
January	$3,352,609.15	19.68		$42,169.88	$3,394,779.03	16.19
February	2,605,310.46	15.29	$ 996,597.69	27,783.27	3,629,691.42	17.31
March	4,045,431.64	23.75	1,075,391.73	11,939.87	5,132,763.24	24.47
April	3,065,852.84	18.00	414,382.46	50,377.46	3,530,612.76	16.84
May	1,256,812.14	7.38	266,369.10	79,824.49	1,603,005.73	7.64
June	656,425.12	3.85		33,164.18	689,589.30	3.29
July	431,832.59	2.53		40,723.55	477,556.14	2.25
August	530,491.90	3.11	329,926.15	17,244.20	877,662.25	4.18
September	262,047.72	1.54	37,459.16	53,274.04	352,780.92	1.68
October	215,426.77	1.27	77,421.06	46,267.65	339,115.48	1.62
November	129,841.53	.76		23,569.79	153,411.32	.73
December	483,514.17	2.84	284,518.32	27,854.77	795,887.26	3.80
Total	$17,035,596.03	100.00	$3,482,065.67	$454,193.15	$20,971,854.85	100.00

TABLE 65—ROAD FUND REVENUE DEPOSITED IN STATE TREASURY.

Year.	Motor license fees.	Federal aid.	Miscellaneous.	Gas tax.	Total.
1911	$ 74,552.59				$ 74,552.59
1912	364,708.03				364,708.03
1913	499,802.45				499,802.45
1914	700,233.00				700,233.00
1915	903,284.09				903,284.09
1916	1,238,483.92				1,238,483.92
1917	1,629,445.26				1,629,445.26
1918	2,770,084.60		$ 85.00		2,770,169.60
1919	3,236,448.71	$ 527,709.65	1,443.50		3,765,601.86
1920	5,856,044.48	5,197,089.40	58,861.68		11,111,995.56
Sub-total	$17,273,087.13	$5,724,799.05	$60,390.18		$23,058,276.36
1921	$ 6,862,125.83	$3,802,430.46	$221,645.55		$10,886,201.84
1922	7,904,219.71	1,733,334.86	132,495.77		9,770,050.34
1923	9,689,702.77	4,257,276.06	135,485.61		14,082,464.44
1924	11,557,838.94	3,565,058.69	300,045.58		15,422,943.21
1925	13,050,977.39	2,717,923.43	514,260.69		16,283,161.51
1926	13,937,579.64	2,036,921.95	214,330.36		16,188,831.95
1927	15,589,365.19	2,997,912.78	216,671.59	$3,953,047.72	22,756,997.28
1928	15,069,830.33	4,054,652.00	425,556.10	2,439,728.14	21,989,766.57
1929	17,035,596.03	3,482,065.67	454,193.15		20,971,854.85
Sub-total	$110,697,235.83	$28,647,575.90	$2,614,684.40	$6,392,775.86	$148,352,271.99
Grand total	$127,970,322.96	$34,372,374.95	$2,675,074.58	$6,392,775.86	$171,410,548.35

TABLE 66—APPROPRIATIONS PAYABLE FROM ROAD FUND.

Year.	For State aid.	For Federal aid.	For maintenance.	For State highways.	For county, township and road district refunds.	For cement plant.
1913	$ 400,000.00					
1914	700,000.00					
1915	1,000,000.00					
1916	1,000,000.00					
1917	1,200,000.00	$ 1,326,000.00				
1919	500,000.00	26,600,000.00				
1921			$3,000,000.00	$20,000,000.00	$3,889,382.23	$5,000,000.00
1923			3,000,000.00	20,000,000.00	4,025,632.56	5,000,000.00
1925			6,000,000.00	35,000,000.00	2,704,818.95	5,000,000.00
1927			6,000,000.00	27,000,000.00	3,000,000.00	5,000,000.00
1929			8,200,000.00	23,000,000.00	2,500,000.00	
Total	$4,800,000.00	$27,926,000.00	$26,200,000.00	$125,000,000.00	$16,119,833.74	$20,000,000.00

TABLE 66—Continued.

Year.	For Fay Hunsley relief.	For gravel plant.	Principal and interest on highway bonds.	Refunds to municipalities.	Construction through municipalities	Bridge at Mt. Carmel.
1913						
1914						
1915						
1916						
1917						
1919		$125,000.00				
1921	$4,000.00		$ 1,000,000.00			
1923			4,000,000.00			
1925			12,320,000.00	$300,000.00	$1,000,000.00	
1927			13,854,420.00	300,000.00	500,000.00	$225,000.00
1929			16,093,100.00		500,000.00	
Total	$4,000.00	$125,000.00	$47,267,520.00	$600,000.00	$2,000,000.00	$225,000.00

TABLE 66—Concluded.

Year.	Refund on Georgetown Bridge.	Refund to City of Gillespie.	Bridge at Hardin.	Acquisition of land and construction of garage.	Total.
1913					$ 400,000.00
1914					700,000.00
1915					1,000,000.00
1916					1,000,000.00
1917					2,526,000.00
1919					27,225,000.00
1921					32,893,382.23
1923					36,025,632.56
1925					62,324,818.95
1927	$19,500.00				55,898,920.00
1929		$18,305.16	$750,000.00	$87,000.00	51,148,405.16
Total	$19,500.00	$18,305.16	$750,000.00	$87,000.00	$271,142,158.90

TABLE 67—EXPENDITURES FROM THE ROAD FUND—1914 TO 1929.

Year.	Administration and engineering.	State aid construction.	State aid recon-struction.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.
1914	----	$364,202.39	----	----	----
1915	$ 22,128.34	630,612.30	----	----	----
1916	3,920.88	656,641.05	----	----	----
1917	113,318.90	992,754.54	----	----	----
1918	21,896.36	334,224.06	----	$ 190,578.78	----
1919	568,099.29	441,060.76	----	3,882,213.47	----
1920	1,054,178.76	209,286.41	----	10,109,977.55	----
Sub-total	$1,783,542.53	$3,628,781.51	----	$14,182,769.80	----
1921	$ 966,262.64	$115,104.51	----	$10,966,994.05	----
1922	575,440.81	32,768.68	----	6,262,162.56	----
1923	1,146,967.70	25,278.46	----	8,087,246.99	----
1924	1,164,610.99	----	$ 619.92	11,306,557.30	$15,869.98
1925	647,380.34	----	263.24	8,540,968.85	30,065.42
1926	1,010,249.17	----	20,021.35	7,529,889.74	17,044.83
1927	986,149.46	----	491,897.15	7,684,245.51	14,519.21
1928	1,293,447.86	----	210,771.36	6,556,539.06	13,436.05
1929	1,059,639.49	----	32,130.58	9,291,478.69	185.30
Sub-total	$8,850,148.46	$173,151.65	$755,703.60	$76,226,082.75	$91,120.79
Total	$10,633,690.99	$3,801,933.16	$755,703.60	$90,408,852.55	$91,120.79

TABLE 67—Continued.

Year.	Additions and betterments.	Maintenance.	Refunds to counties.	Refund Georgetown Bridge.	Fay Hunsley relief.
1914	----	----	----	----	----
1915	----	$ 14,657.73	----	----	----
1916	----	17,125.25	----	----	----
1917	----	34,307.21	----	----	----
1918	----	37,303.98	----	----	----
1919	----	84,614.37	----	----	----
1920	----	208,802.55	----	----	----
Sub-total	----	$396,811.09	----	----	----
1921	----	$ 358,658.85	$ 719,273.18	----	$4,000.00
1922	----	640,503.01	1,798,184.50	----	----
1923	----	1,110,034.41	1,411,337.49	----	----
1924	$ 35,123.82	2,044,860.69	1,176,893.14	----	----
1925	50,791.99	1,834,637.74	602,050.80	----	----
1926	52,844.88	2,264,770.58	499,202.93	----	----
1927	81,729.73	2,721,444.45	368,187.25	$19,500.00	----
1928	113,925.00	2,771,710.63	1,540,435.85	----	----
1929	49,992.22	3,225,000.56	601,510.78	----	----
Sub-total	$384,407.64	$16,971,620.92	$8,717,075.92	$19,500.00	$4,000 00
Total	$384,407.64	$17,368,432.01	$8,717,075.92	$19,500.00	$4,000.00

TABLE 67—Concluded.

Year.	Interest and principal on $60,000,000 and $100,000,000 bonds.	Construction through municipalities.	Refunds to municipalities.	Total.
1914				$ 364,202.39
1915				667,398.37
1916				677,687.18
1917				1,140,380.65
1918				584,003.18
1919				4,975,987.89
1920				11,582,245.27
Sub-total				$19,991,904.93
1921				$13,130,293.23
1922	$ 96,120.00			9,405,179.56
1923	661.340.00			12,442,205.05
1924	1,388,813.35			17,133,349.19
1925	2,687,303.72	$ 19,592.59		14,413,054.69
1926	5,510,843.18	538,374.33		17,443,240.99
1927	5,606,009.75	325,859.68	$210,864.06	18,510,406.25
1928	6,149,016.11	13,300.39	89,795.19	18,752,377.50
1929	7,429,636.19	65,601.84	125,838.04	21,881,013.69
Sub-total	$29,529,082.30	$962.728.83	$426,497.29	$143,111,120.15
Total	$29,529,082.30	$962,728.83	$426,497.29	$163,103,025.08

TABLE 68—STATEMENT SHOWING ROAD FUND BALANCES, RECEIPTS AND EXPENDITURES BY MONTHS FOR THE CALENDAR YEAR 1929.

Month.	Balance at beginning of month.	Receipts during month.	Per cent of total receipts.	Total.
January	$ 2,823.906.25	$3,394,779.03	16.19	$ 6,218,685.28
February	5,478,199.85	3,629,691.42	17.31	9,107,891.27
March	8,015,350.11	5,132,763.24	24.47	13,148,113.35
April	10,228,332.28	3,530,612.76	16.84	13,758,945.04
May	12,035,620.18	1,603,005.73	7.64	13,638,625.91
June	7,134,419.27	689,589.30	3.29	7,824,008.57
July	3,590,042.74	472,556.14	2.25	4,062,598.88
August	3,565,801.17	877,662.25	4.18	4,443,463.42
September	3,933,943.82	352,780.92	1.68	4,286,724.74
October	2,686,662.29	339,115.48	1.62	3,025,777.77
November	2,568,735.47	153,411.32	.73	2,722,146.79
December	1,477,956.58	795,887.26	3.80	2,273,843.84
Total	$2,823,906.25	$20,971,854.85	100.00	$23,795,761.10

TABLE 68—Concluded.

Month.	Expenditures during month.	Per cent of total expenditures.	Balance at end of month.
January	$ 740,485.43	3.38	$ 5,478,199.85
February	1,092,541.16	4.99	8,015,350.11
March	2,919,781.07	13.34	10,228,332.28
April	1,723,324.86	7.88	12,035,620.18
May	6,504,206.64	29.73	7,134,419.27
June	4,233,965.83	19.35	3,590,042.74
July	496,797.71	2.27	3,565,801.17
August	509,519.60	2.33	3,933,943.82
September	1,600,062.45	7.31	2,686,662.29
October	457,042.30	2.09	2,568,735.47
November	1,244,190.21	5.69	1,477,956.58
December	359,096.43	1.64	1,914,747.41
Total	$21,881,013.69	100.00	$1,914,747.41

TABLE 69—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $60,000,000.00—4% BONDS.

Total Bond Voted November 4, 1918	$60,000,000.00
Total Bond Authorized for Sale	$60,000,000.00

Year in which principal is to be retired and interest paid.	Principal of all series to be retired each year.	Interest on all series to be paid each year.	Total payable all series each year.	Accumulative total all series payable each year.
1922		$ 100,000.00	$ 100,000.00	$ 100,000.00
1923		680,000.00	680,000.00	780,000.00
1924		1,380,000.00	1,380,000.00	2,160,000.00
1925		2,160,000.00	2,160,000.00	4,320,000.00
1926	$2,000,000.00	2,400,000.00	4,400,000.00	8,720,000.00
1927	2,000,000.00	2,320,000.00	4,320,000.00	13,040,000.00
1928	2,000,000.00	2,240,000.00	4,240,000.00	17,280,000.00
1929	2,000,000.00	2,160,000.00	4,160,000.00	21,440,000.00
1930	2,000,000.00	2,080,000.00	4,080,000.00	25,520,000.00
1931	2,000,000.00	2,000,000.00	4,000,000.00	29,520,000.00
1932	2,000,000.00	1,920,000.00	3,920,000.00	33,440,000.00
1933	2,000,000.00	1,840,000.00	3,840,000.00	37,280,000.00
1934	2,000,000.00	1,760,000.00	3,760,000.00	41,040,000.00
1935	3,000,000.00	1,680,000.00	4,680,000.00	45,720,000.00
1936	3,000,000.00	1,560,000.00	4,560,000.00	50,280,000.00
1937	3,000,000.00	1,440,000.00	4,440,000.00	54,720,000.00
1938	4,000,000.00	1,320,000.00	5,320,000.00	60,040,000.00
1939	4,000,000.00	1,160,000.00	5,160,000.00	65,200,000.00
1940	5,000,000.00	1,000,000.00	6,000,000.00	71,200,000.00
1941	5,000,000.00	800,000.00	5,800,000.00	77,000,000.00
1942	5,000,000.00	600,000.00	5,600,000.00	82,600,000.00
1943	5,000,000.00	400,000.00	5,400,000.00	88,000,000.00
1944	5,000,000.00	200,000.00	5,200,000.00	93,200,000.00
Total	$60,000,000.00	$33,200,000.00	$93,200,000.00	$93,200,000.00

TABLE 70—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 1—$5,000,000.00—4% BONDS.

Date of sale—Oct. 25, 1921. Date of issue—Nov. 1, 1921. Rate $94.020. Yield $4.83.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1922		$100,000.00	$100,000.00	$ 100,000.00
1923		200,000.00	200,000.00	300,000.00
1924		200,000.00	200,000.00	500,000.00
1925		200,000.00	200,000.00	700,000.00
1926	$500,000.00	200,000.00	700,000.00	1,400,000.00
1927	500,000.00	180,000.00	680,000.00	2,080,000.00
1928	500,000.00	160,000.00	660,000.00	2,740,000.00
1929	500,000.00	140,000.00	640,000.00	3,380,000.00
1930	500,000.00	120,000.00	620,000.00	4,000,000.00
1931	500,000.00	100,000.00	600,000.00	4,600,000.00
1932	500,000.00	80,000.00	580,000.00	5,180,000.00
1933	500,000.00	60,000.00	560,000.00	5,740,000.00
1934	500,000.00	40,000.00	540,000.00	6,280,000.00
1935	500,000.00	20,000.00	520,000.00	6,800,000.00
Total	$5,000,000.00	$1,800,000.00	$6,800,000.00	$6,800,000.00

TABLE 71—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$6,000,000.00—4% BONDS.

Date of sale—April 13, 1922. Date of issue—May 1, 1922. Rate $98.875. Yield 4.19.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000.000,00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE 72—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$6,000,000.00—4% BONDS.

Date of sale—Sept. 18, 1922. Date of issue—May 1, 1922. Rate $99.688. Yield 4.04.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1923		$240,000.00	$240,000.00	$ 240,000.00
1924		240,000.00	240,000.00	480,000.00
1925		240,000.00	240,000.00	720,000.00
1926		240,000.00	240,000.00	960,000.00
1927		240,000.00	240,000.00	1,200,000.00
1928		240,000.00	240,000.00	1,440,000.00
1929	$500,000.00	240,000.00	740,000.00	2,180,000.00
1930	500,000.00	220,000.00	720,000.00	2,900,000.00
1931	500,000.00	200,000.00	700,000.00	3,600,000.00
1932	500,000.00	180,000.00	680,000.00	4,280,000.00
1933	500,000.00	160,000.00	660,000.00	4,940,000.00
1934	500,000.00	140,000.00	640,000.00	5,580,000.00
1935	500,000.00	120,000.00	620,000.00	6,200,000.00
1936	500,000.00	100,000.00	600,000.00	6,800,000.00
1937	500,000.00	80,000.00	580,000.00	7,380,000.00
1938	500,000.00	60,000.00	560,000.00	7,940,000.00
1939	500,000.00	40,000.00	540,000.00	8,480,000.00
1940	500,000.00	20,000.00	520,000.00	9,000,000.00
Total	$6,000,000.00	$3,000,000.00	$9,000,000.00	$9,000,000.00

TABLE 73—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$6,000,000.00—4% BONDS.

Date of sale—Feb. 20, 1923. Date of issue—March 1, 1923. Rate $98.183. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$240,000.00	$ 240,000.00	$ 240,000.00
1925		240,000.00	240,000.00	480,000.00
1926		240,000.00	240,000.00	720,000.00
1927		240,000.00	240,000.00	960,000.00
1928		240,000.00	240,000.00	1,200,000.00
1929		240,000.00	240,000.00	1,440,000.00
1930		240,000.00	240,000.00	1,680,000.00
1931		240,000.00	240,000.00	1,920,000.00
1932		240,000.00	240,000.00	2,160,000.00
1933		240,000.00	240,000.00	2,400,000.00
1934		240,000.00	240,000.00	2,640,000.00
1935		240,000.00	240,000.00	2,880,000.00
1936		240,000.00	240,000.00	3,120,000.00
1937		240,000.00	240,000.00	3,360,000.00
1938	$1,000,000.00	240,000.00	1,240,000.00	4,600,000.00
1939	1,000,000.00	200,000.00	1,200,000.00	5,800,000.00
1940	1,000,000.00	160,000.00	1,160,000.00	6,960,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	8,080,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	9,160,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	10,200,000.00
Total	$6,000,000.00	$4,200,000.00	$10,200,000.00	$10,200,000.00

TABLE 74—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 5—$7,000,000.00—4% BONDS.

Date of sale—May 25, 1923. Date of issue—May 1, 1923. Rate $97.000. Yield 4.40.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$280,000.00	$280,000.00	$ 280,000.00
1925		280,000.00	280,000.00	560,000.00
1926	$ 500,000.00	280,000.00	780,000.00	1,340,000.00
1927	500,000.00	260,000.00	760,000.00	2,100,000.00
1928	500,000.00	240,000.00	740,000.00	2,840,000.00
1929	500,000.00	220,000.00	720,000.00	3,560,000.00
1930	500,000.00	200,000.00	700,000.00	4,260,000.00
1931	500,000.00	180,000.00	680,000.00	4,940,000.00
1932	500,000.00	160,000.00	660,000.00	5,600,000.00
1933	500,000.00	140,000.00	640,000.00	6,240,000.00
1934	500,000.00	120,000.00	620,000.00	6,860,000.00
1935	500,000.00	100,000.00	600,000.00	7,460,000.00
1936	1,000,000.00	80,000.00	1,080,000.00	8,540,000.00
1937	1,000,000.00	40,000.00	1,040,000.00	9,580,000.00
Total	$7,000,000.00	$2,580,000.00	$9,580,000.00	$9,580,000.00

TABLE 75—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 16, 1923. Date of issue—Oct. 1, 1923. Rate $94.41. Yield 4.68.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at May 1.	Interest on this issue payable at May 1 each year.	Total this issue payable at May 1 each year.	Accumulative total this issue payable to May 1 each year.
1924		$140,000.00	$ 140,000.00	$ 140,000.00
1925		240,000.00	240,000.00	380,000.00
1926	$1,000,000.00	240,000.00	1,240,000.00	1,620,000.00
1927	1,000,000.00	200,000.00	1,200,000.00	2,820,000.00
1928	1,000,000.00	160,000.00	1,160,000.00	3,980,000.00
1929		120,000.00	120,000.00	4,100,000.00
1930		120,000.00	120,000.00	4,220,000.00
1931		120,000.00	120,000.00	4,340,000.00
1932		120,000.00	120,000.00	4,460,000.00
1933		120,000.00	120,000.00	4,580,000.00
1934		120,000.00	120,000.00	4,700,000.00
1935		120,000.00	120,000.00	4,820,000.00
1936		120,000.00	120,000.00	4,940,000.00
1937		120,000.00	120,000.00	5,060,000.00
1938		120,000.00	120,000.00	5,180,000.00
1939		120,000.00	120,000.00	5,300,000.00
1940		120,000.00	120,000.00	5,420,000.00
1941	1,000,000.00	120,000.00	1,120,000.00	6,540,000.00
1942	1,000,000.00	80,000.00	1,080,000.00	7,620,000.00
1943	1,000,000.00	40,000.00	1,040,000.00	8,660,000.00
Total	$6,000,000.00	$2,660,000.00	$8,660,000.00	$8,660,000.00

TABLE 76—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 7—$6,000,000.00—4% BONDS.

Date of sale—Dec. 22, 1923. Date of issue—Jan. 1, 1924. Rate $94.46. Yield $4.50.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1924		$ 40,000.00	$ 40,000.00	$ 40,000.00
1925		240,000.00	240,000.00	280,000.00
1926		240,000.00	240,000.00	520,000.00
1927		240,000.00	240,000.00	760,000.00
1928		240,000.00	240,000.00	1,000,000.00
1929		240,000.00	240,000.00	1,240,000.00
1930		240,000.00	240,000.00	1,480,000.00
1931		240,000.00	240,000.00	1,720,000.00
1932		240,000.00	240,000.00	1,960,000.00
1933		240,000.00	240,000.00	2,200,000.00
1934		240,000.00	240,000.00	2,440,000.00
1935		240,000.00	240,000.00	2,680,000.00
1936		240,000.00	240,000.00	2,920,000.00
1937	$1,000,000.00	240,000.00	1,240,000.00	4,160,000.00
1938	1,000,000.00	200,000.00	1,200,000.00	5,360,000.00
1939	1,000,000.00	160,000.00	1,160,000.00	6,520,000.00
1940	1,000,000.00	120,000.00	1,120,000.00	7,640,000.00
1941	1,000,000.00	80,000.00	1,080,000.00	8,720,000.00
1942	1,000,000.00	40,000.00	1,040,000.00	9,760,000.00
Total	$6,000,000.00	$3,760,000.00	$9,760,000.00	$9,760,000.00

TABLE 77—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 8—$9,000,000.00—4% BONDS

Date of sale—June 3, 1924. Date of issue—June 1, 1924. Rate $96.525. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$270,000.00	$ 270,000.00	$ 270,000.00
1926		360,000.00	360,000.00	630,000.00
1927		360,000.00	360,000.00	990,000.00
1928		360,000.00	360,000.00	1,360,000.00
1929		360,000.00	360,000.00	1,710,000.00
1930		360,000.00	360,000.00	2,070,000.00
1931		360,000.00	360,000.00	2,430,000.00
1932		360,000.00	360,000.00	2,790,000.00
1933		360,000.00	360,000.00	3,150,000.00
1934		360,000.00	360,000.00	3,510,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,370,000.00
1936	500,000.00	340,000.00	840,000.00	5,210,000.00
1937		320,000.00	320,000.00	5,530,000.00
1938		320,000.00	320,000.00	5,850,000.00
1939		320,000.00	320,000.00	6,170,000.00
1940	1,000,000.00	320,000.00	1,320,000.00	7,490,000.00
1941	1,000,000.00	280,000.00	1,280,000.00	8,770,000.00
1942	2,000,000.00	240,000.00	2,240,000.00	11,010,000.00
1943	2,000,000.00	160,000.00	2,160,000.00	13,170,000.00
1944	2,000,000.00	80,000.00	2,080,000.00	15,250,000.00
Total	$9,000,000.00	$6,250,000.00	$15,250,000.00	$15,250,000.00

TABLE 78—$60,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—August 15, 1924. Date of issue—August 1, 1924. Rate $99.109. Yield 4.08.

Year in which principal is to be retired and interest paid.	Principal of this issue to be retired at Mar. 1 each year.	Interest on this issue payable at Mar. 1 each year.	Total this issue payable at Mar. 1 each year.	Accumulative total this issue payable at Mar. 1 each year.
1925		$210,000.00	$ 210,000.00	$ 210,000.00
1926		360,000.00	360,000.00	570,000.00
1927		360,000.00	360,000.00	930,000.00
1928		360,000.00	360,000.00	1,290,000.00
1929		360,000.00	360,000.00	1,650,000.00
1930		360,000.00	360,000.00	2,010,000.00
1931		360,000.00	360,000.00	2,370,000.00
1932		360,000.00	360,000.00	2,730,000.00
1923		360,000.00	360,000.00	3,090,000.00
1934		360,000.00	360,000.00	3,450,000.00
1935	$ 500,000.00	360,000.00	860,000.00	4,310,000.00
1936	500,000.00	340,000.00	840,000.00	5,150,000.00
1937		320,000.00	320,000.00	5,470,000.00
1938	1,000,000.00	320,000.00	1,320,000.00	6,790,000.00
1939	1,000,000.00	280,000.00	1,280,000.00	8,070,000.00
1940	1,000,000.00	240,000.00	1,240,000.00	9,310,000.00
1941	1,000,000.00	200,000.00	1,200,000.00	10,510,000.00
1942		160,000.00	160,000.00	10,670,000.00
1943	1,000,000.00	160,000.00	1,160,000.00	11,830,000.00
1944	3,000,000.00	120,000.00	3,120,000.00	14,950,000.00
Total	$9,000,000.00	$5,950,000.00	$14,950,000.00	$14,950,000.00

TABLE 79—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $60,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Total deposited bond fund.	Accrued interest deposited in road fund.
1921	Oct. 25	94,020	4.83	$5,000,000.00	$4,709,477.78	$4,709,477.78	
1922	Apr. 13	98,875	4.19	6,000,000.00	5,940,111.11	5,940,111.11	
1922	Sept. 18	99.688	4.04	6,000,000.00	6,083,855.65	6,083,855.65	
1923	Feb. 20	98.183	4.15	6,000,000.00	5,908,333.34	5,908,333.34	
1923	May 25	97.000	4.40	7,000,000.00	6,837,667.68	6,837,667.68	
1923	Oct. 16	94.41	4.68	6,000,000.00	5,687,266.68	5,687,266.68	
1923	Dec. 22	94.46	4.50	6,000,000.00	5,678,266.67	5,667,600.00	$10,666.67
1924	June 3	96.525	4.29	9,000,000.00	8,704,200.00	8,704,200.00	
1924	Aug. 15	99.109	4.08	9,000,000.00	8,947,800.00	8,919,800.00	28,000.00
Total		97.4305	4.105	$60,000,000.00	$58,496,978.91	$58,458,312.24	$38,666.67

Note.—The figure of 4.105 shown under Interest Yield represents the weighted average yield of all series sold.

The figures of 97.4305 shown in the sale rate column represents the average sale rate on all series sold.

TABLE 80—APPROPRIATIONS PAYABLE FROM $60,000,000.00 BOND ISSUE FUNDS.

Year.	For construction.	For county refunds.	Total.
1921	$30,000,000.00	$2,869,289.87	$32,869,289.87
1922			
1923	30,000,000.00		30,000,000.00
Total	$60,000,000.00	$2,869,289.87	$62,869,289.87

TABLE 81—EXPENDITURES FROM $60,000,000.00 BOND ISSUE FUND—1921 TO 1924.

Year.	Administration and engineering.	Equipment.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.	Additions and betterments.	Refunds to counties.	Total.
1921	$ 263,200.43	$ 1,385.84	$ 2,196,414.38			$ 8,000.00	$ 2,469,000.65
1922	1,142,994.16	16,061.96	11,261,655.37			637,820.93	13,058,532.42
1923	1,124,027.08	14,740.53	17,469,029.10			605,182.71	19,212,979.42
1924	1,629,293.10	27,196.14	22,054,166.95	$681.92	$6,461.64		23,717,799.75
Total	$4,159,514.77	$59,384.47	$52,981,265.80	$681.92	$6,461.64	$1,251,003.64	$58,458,312.24

TABLE 82—HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS ON ALL SERIES OF $98,000,000.00—4% BONDS SOLD TO DECEMBER 31, 1929. TOTAL BONDS VOTED NOVEMBER 4, 1924—$100,000,000.00. TOTAL BONDS AUTHORIZED FOR SALE—$100,000,000.00

Year in which principal is to be retired and interest paid.	Principal to be retired March 1st each year.	Principal to be retired May 1 each year.	Total principal to be retired during year.	Interest to be paid March 1st each year.	Interest to be paid May 1st each year.	Interest to be paid Sept. 1st each year.	Interest to be paid Nov. 1st each year.	Total interest payable each year.	Total payable all series each year.
1925					$ 53,333.33	$400,000.00	$ 80,000.00	$ 533,333.33	$ 533,333.33
1926				$400,000.00	130,000.00	400,000.00	180,000.00	1,110,000.00	1,110,000.00
1927				400,000.00	180,000.00	400,000.00	320,000.00	1,300,000.00	1,300,000.00
1928				400,000.00	420,000.00	486,666.67	620,000.00	1,926,666.67	1,926,666.67
1929				660,000.00	880,000.00	760,000.00	953,333.33	3,253,333.33	3,253,333.33
1930				860,000.00	1,100,000.00	860,000.00	1,100,000.00	3,920,000.00	3,920,000.00
1931				860,000.00	1,100,000.00	860,000.00	1,100,000.00	3,920,000.00	3,920,000.00
1932		$ 500,000.00	$ 500,000.00	860,000.00	1,100,000.00	860,000.00	1,090,000.00	3,910,000.00	4,410,000.00
1933		500,000.00	500,000.00	860,000.00	1,090,000.00	860,000.00	1,080,000.00	3,890,000.00	4,390,000.00
1934		500,000.00	500,000.00	860,000.00	1,080,000.00	860,000.00	1,070,000.00	3,870,000.00	4,370,000.00
1935		500,000.00	500,000.00	860,000.00	1,070,000.00	860,000.00	1,060,000.00	3,850,000.00	4,350,000.00
1936		500,000.00	500,000.00	860,000.00	1,060,000.00	860,000.00	1,050,000.00	3,830,000.00	4,330,000.00
1937		500,000.00	500,000.00	860,000.00	1,050,000.00	860,000.00	1,040,000.00	3,810,000.00	4,310,000.00
1938		500,000.00	500,000.00	860,000.00	1,040,000.00	860,000.00	1,030,000.00	3,790,000.00	4,290,000.00
1939		500,000.00	500,000.00	860,000.00	1,030,000.00	860,000.00	1,020,000.00	3,770,000.00	4,270,000.00
1940				860,000.00	1,020,000.00	860,000.00	1,020,000.00	3,760,000.00	3,760,000.00
1941				860,000.00	1,020,000.00	860,000.00	1,020,000.00	3,760,000.00	3,760,000.00
1942				860,000.00	1,020,000.00	860,000.00	1,020,000.00	3,760,000.00	3,760,000.00
1943				860,000.00	1,020,000.00	860,000.00	1,020,000.00	3,760,000.00	3,760,000.00
1944				860,000.00	1,020,000.00	860,000.00	1,020,000.00	3,760,000.00	3,760,000.00
1945	$2,500,000.00	3,000,000.00	5,500,000.00	860,000.00	1,020,000.00	810,000.00	960,000.00	3,650,000.00	9,150,000.00
1946	2,500,000.00	3,000,000.00	5,500,000.00	810,000.00	960,000.00	760,000.00	900,000.00	3,430,000.00	8,930,000.00
1947	2,500,000.00	3,000,000.00	5,500,000.00	760,000.00	900,000.00	710,000.00	840,000.00	3,210,000.00	8,710,000.00
1948	2,500,000.00	3,000,000.00	5,500,000.00	710,000.00	840,000.00	660,000.00	780,000.00	2,990,000.00	8,490,000.00
1949	3,000,000.00	3,000,000.00	6,000,000.00	660,000.00	780,000.00	600,000.00	720,000.00	2,760,000.00	8,760,000.00
1950	3,000,000.00	3,000,000.00	6,000,000.00	600,000.00	720,000.00	540,000.00	660,000.00	2,520,000.00	8,520,000.00
1951	3,000,000.00	3,000,000.00	6,000,000.00	540,000.00	660,000.00	480,000.00	600,000.00	2,280,000.00	8,280,000.00
1952	3,000,000.00	3,000,000.00	6,000,000.00	480,000.00	600,000.00	420,000.00	540,000.00	2,040,000.00	8,040,000.00
1953	3,000,000.00	3,500,000.00	6,500,000.00	420,000.00	540,000.00	360,000.00	470,000.00	1,790,000.00	8,290,000.00
1954	3,000,000.00	3,500,000.00	6,500,000.00	360,000.00	470,000.00	300,000.00	400,000.00	1,530,000.00	8,030,000.00
1955	2,500,000.00	4,000,000.00	6,500,000.00	300,000.00	400,000.00	250,000.00	320,000.00	1,270,000.00	7,770,000.00
1956	2,500,000.00	4,000,000.00	6,500,000.00	250,000.00	320,000.00	200,000.00	240,000.00	1,010,000.00	7,510,000.00
1957	3,500,000.00	4,000,000.00	7,500,000.00	200,000.00	240,000.00	130,000.00	160,000.00	730,000.00	8,230,000.00
1958	3,500,000.00	4,000,000.00	7,500,000.00	130,000.00	160,000.00	60,000.00	80,000.00	430,000.00	7,930,000.00
1959	3,000,000.00	4,000,000.00	7,000,000.00	60,000.00	80,000.00			140,000.00	7,140,000.00
Total	$43,000,000.00	$55,000,000.00	$98,000,000.00	$21,900,000.00	$26,173,333.33	$21,626,666.67	$25,563,333.33	$95,263,333.33	$193,263,333.33

TABLE 83—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 1—$4,000,000.00—4% BONDS.

Date of sale—December 30, 1924. Date of issue—January 1, 1925. Rate $97.5575. Yield 4.29.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925		$53,333.33	$80,000.00	$133,333.33	$133,333.33
1926		80,000.00	80,000.00	160,000.00	160,000.00
1927		80,000.00	80,000.00	160,000.00	160,000.00
1928		80,000.00	80,000.00	160,000.00	160,000.00
1929		80,000.00	80,000.00	160,000.00	160,000.00
1930		80,000.00	80,000.00	160,000.00	160,000.00
1931		80,000.00	80,000.00	160,000.00	160,000.00
1932	$500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1933	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1934	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1935	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1936	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1937	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1938	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1939	500,000.00	10,000.00		10,000.00	510,000.00
Total	$4,000,000.00	$893,333.33	$840,000.00	$1,733,333.33	$5,733,333.33

TABLE 84—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 2—$10,000,000.00—4% BONDS.

Date of sale—May 20, 1925. Date of issue—March 1, 1925. Rate $99.881. Yield 4.008.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE 85—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 3—$10,000,000 00—4% BONDS.

Date of sale—September 1, 1925. Date of issue—March 1, 1925. Rate $96.422. Yield 4.24.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1925			$200,000.00	$200,000.00	$ 200,000.00
1926		$200,000.00	200,000.00	400,000.00	400,000.00
1927		200,000.00	200,000.00	400,000.00	400,000.00
1928		200,000.00	200,000.00	400,000.00	400,000.00
1929		200,000.00	200,000.00	400,000.00	400,000.00
1930		200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$1,000,000.00	200,000.00	180,000.00	380,000.00	1,380,000.00
1946	1,000,000.00	180,000.00	160,000.00	340,000.00	1,340,000.00
1947	1,000,000.00	160,000.00	140,000.00	300,000.00	1,300,000.00
1948	1,000,000.00	140,000.00	120,000.00	260,000.00	1,260,000.00
1949	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1950	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1951	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1952	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1953	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1954	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$10,000,000.00	$4,900,000.00	$4,900,000.00	$9,800,000.00	$19,800,000.00

TABLE 86—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATIONS—SERIES NO. 4—$5,000,000.00—4% BONDS.

Date of sale—Feb. 17, 1926. Date of issue—Feb. 1, 1926. Rate $99.062. Yield 4.062.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1926		$ 50,000.00	$100,000.00	$150,000.00	$150,000.00
1927		100,000.00	100,000.00	200,000.00	200,000.00
1928		100,000.00	100,000.00	200,000.00	200,000.00
1929		100,000.00	100,000.00	200,000.00	200,000.00
1930		100,000.00	100,000.00	200,000.00	200,000.00
1931		100,000.00	100,000.00	200,000.00	200,000.00
1932		100,000.00	100,000.00	200,000.00	200,000.00
1933		100,000.00	100,000.00	200,000.00	200,000.00
1934		100,000.00	100,000.00	200,000.00	200,000.00
1935		100,000.00	100,000.00	200,000.00	200,000.00
1936		100,000.00	100,000.00	200,000.00	200,000.00
1937		100,000.00	100,000.00	200,000.00	200,000.00
1938		100,000.00	100,000.00	200,000.00	200,000.00
1939		100,000.00	100,000.00	200,000.00	200,000.00
1940		100,000.00	100,000.00	200,000.00	200,000.00
1941		100,000.00	100,000.00	200,000.00	200,000.00
1942		100,000.00	100,000.00	200,000.00	200,000.00
1943		100,000.00	100,000.00	200,000.00	200,000.00
1944		100,000.00	100,000.00	200,000.00	200,000.00
1945	$500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1946	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1947	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1948	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1949	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1950	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1951	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1952	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1953	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1954	500,000.00	10,000.00		10,000.00	510,000.00
Total	$5,000,000.00	$2,400,000.00	$2,350,000.00	$4,750,000.00	$9,750,000.00

TABLE 87—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 5—$6,000,000.00—4% BONDS.

Date of sale—April 26, 1927. Date of issue—May 1, 1927. Rate $101.601. Yield 3.895.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1927			$120,060.00	$120,000.00	$120,000.00
1928		$120,000.00	120,000.00	240,000.00	240,000.00
1929		120,000.00	120,000.00	240,000.00	240,000.00
1930		120,000.00	120,000.00	240,000.00	240,000.00
1931		120,000.00	120,000.00	240,000.00	240,000.00
1932		120,000.00	120,000.00	240,000.00	240,000.00
1933		120,000.00	120,000.00	240,000.00	240,000.00
1934		120,000.00	120,000.00	240,000.00	240,000.00
1935		120,000.00	120,000.00	240,000.00	240,000.00
1936		120,000.00	120,000.00	240,000.00	240,000.00
1937		120,000.00	120,000.00	240,000.00	240,000.00
1938		120,000.00	120,000.00	240,000.00	240,000.00
1939		120,000.00	120,000.00	240,000.00	240,000.00
1940		120,000.00	120,000.00	240,000.00	240,000.00
1941		120,000.00	120,000.00	240,000.00	240,000.00
1942		120,000.00	120,000.00	240,000.00	240,000.00
1943		120,000.00	120,000.00	240,000.00	240,000.00
1944		120,000.00	120,000.00	240,000.00	240,000.00
1945	$500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1946	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1947	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1948	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1949	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1950	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1951	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1952	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1953	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1954	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1955	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1956	500,000.00	10,000.00		10,000.00	510,000.00
Total	$6,000,000.00	$2,820,000.00	$2,820,000.00	$5,640,000.00	$11,640,000.00

TABLE 88—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 6—$6,000,000.00—4% BONDS.

Date of sale—Oct. 11, 1927. Date of issue—Oct. 1, 1927. Rate $101.016. Yield 3.930.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1927			$ 20,000.00	$ 20,000.00	$ 20,000.00
1928		$120,000.00	120,000.00	240,000.00	240,000.00
1929		120,000.00	120,000.00	240,000.00	240,000.00
1930		120,000.00	120,000.00	240,000.00	240,000.00
1931		120,000.00	120,000.00	240,000.00	240,000.00
1932		120,000.00	120,000.00	240,000.00	240,000.00
1933		120,000.00	120,000.00	240,000.00	240,000.00
1934		120,000.00	120,000.00	240,000.00	240,000.00
1935		120,000.00	120,000.00	240,000.00	240,000.00
1936		120,000.00	120,000.00	240,000.00	240,000.00
1937		120,000.00	120,000.00	240,000.00	240,000.00
1938		120,000.00	120,000.00	240,000.00	240,000.00
1939		120,000.00	120,000.00	240,000.00	240,000.00
1940		120,000.00	120,000.00	240,000.00	240,000.00
1941		120,000.00	120,000.00	240,000.00	240,000.00
1942		120,000.00	120,000.00	240,000.00	240,000.00
1943		120,000.00	120,000.00	240,000.00	240,000.00
1944		120,000.00	120,000.00	240,000.00	240,000.00
1945	$500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1946	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1947	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1948	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1949	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1950	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1951	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1952	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1953	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1954	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1955	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1956	500,000.00	10,000.00		10,000.00	510,000.00
Total	$6,000,000.00	$2,820,000.00	$2,720,000.00	$5,540,000.00	$11,540,000.00

TABLE 89—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION SERIES NO. 7—$7,000,000.00—4% BONDS.

Date of sale—May 15, 1928. Date of issue—May 1, 1928. Rate $99.321. Yield 4.045.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928			$140,000.00	$140,000.00	$140,000.00
1929		$140,000.00	140,000.00	280,000.00	280,000.00
1930		140,000.00	140,000.00	280,000.00	280,000.00
1931		140,000.00	140,000.00	280,000.00	280,000.00
1932		140,000.00	140,000.00	280,000.00	280,000.00
1933		140,000.00	140,000.00	280,000.00	280,000.00
1934		140,000.00	140,000.00	280,000.00	280,000.00
1935		140,000.00	140,000.00	280,000.00	280,000.00
1936		140,000.00	140,000.00	280,000.00	280,000.00
1937		140,000.00	140,000.00	280,000.00	280,000.00
1938		140,000.00	140,000.00	280,000.00	280,000.00
1939		140,000.00	140,000.00	280,000.00	280,000.00
1940		140,000.00	140,000.00	280,000.00	280,000.00
1941		140,000.00	140,000.00	280,000.00	280,000.00
1942		140,000.00	140,000.00	280,000.00	280,000.00
1943		140,000.00	140,000.00	280,000.00	280,000.00
1944		140,000.00	140,000.00	280,000.00	280,000.00
1945	$500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1946	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1947	500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1948	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1949	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1950	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1951	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1952	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1953	500,000.00	60,000.00	50,000.00	110,000.00	610,000.00
1954	500,000.00	50,000.00	40,000.00	90,000.00	590,000.00
1955	500,000.00	40,000.00	30,000.00	70,000.00	570,000.00
1956	500,000.00	30,000.00	20,000.00	50,000.00	550,000.00
1957	500,000.00	20,000.00	10,000.00	30,000.00	530,000.00
1958	500,000.00	10,000.00		10,000.00	510,000.00
Total	$7,000,000.00	$3,290,000.00	$3,290,000.00	$6,580,000.00	$13,580,000.00

TABLE 90—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 8—$13,000,000.00—4% BONDS.

Date of sale—July 17, 1928. Date of issue—July 1, 1928.—Rate $96.266. Yield 4.225.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928			$ 86,666.67	$ 86,666.67	$ 86,666.67
1929		$260,000.00	260,000.00	520,000.00	520,000.00
1930		260,000.00	260,000.00	520,000.00	520,000.00
1931		260,000.00	260,000.00	520,000.00	520,000.00
1932		260,000.00	260,000.00	520,000.00	520,000.00
1933		260,000.00	260,000.00	520,000.00	520,000.00
1934		260,000.00	260,000.00	520,000.00	520,000.00
1935		260,000.00	260,000.00	520,000.00	520,000.00
1936		260,000.00	260,000.00	520,000.00	520,000.00
1937		260,000.00	260,000.00	520,000.00	520,000.00
1938		260,000.00	260,000.00	520,000.00	520,000.00
1939		260,000.00	260,000.00	520,000.00	520,000.00
1940		260,000.00	260,000.00	520,000.00	520,000.00
1941		260,000.00	260,000.00	520,000.00	520,000.00
1942		260,000.00	260,000.00	520,000.00	520,000.00
1943		260,000.00	260,000.00	520,000.00	520,000.00
1944		260,000.00	260,000.00	520,000.00	520,000.00
1945		260,000.00	260,000.00	520,000.00	520,000.00
1946		260,000.00	260,000.00	520,000.00	520,000.00
1947		260,000.00	260,000.00	520,000.00	520,000.00
1948		260,000.00	260,000.00	520,000.00	520,000.00
1949	$ 500,000.00	260,000.00	250,000.00	510,000.00	1,010,000.00
1950	500,000.00	250,000.00	240,000.00	490,000.00	990,000.00
1951	500,000.00	240,000.00	230,000.00	470,000.00	970,000.00
1952	500,000.00	230,000.00	220,000.00	450,000.00	950,000.00
1953	500,000.00	220,000.00	210,000.00	430,000.00	930,000.00
1954	500,000.00	210,000.00	200,000.00	410,000.00	910,000.00
1955	2,000,000.00	200,000.00	160,000.00	360,000.00	2,360,000.00
1956	2,000,000.00	160,000.00	120,000.00	280,000.00	2,280,000.00
1957	3,000,000.00	120,000.00	60,000.00	180,000.00	3,180,000.00
1958	3,000,000.00	60,000.00		60,000.00	3,060,000.00
Total	$13,000,000.00	$7,150,000.00	$6,976,666.67	$14,126,666.67	$27,126,666.67

TABLE 91—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 9—$9,000,000.00—4% BONDS.

Date of sale—September 18, 1928. Date of issue—September 1, 1928. Rate $97.255. Yield 4.185.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928			$ 60,000.00	$ 60,000.00	$ 60,000.00
1929		180,000.00	180,000.00	360,000.00	360,000.00
1930		180,000.00	180,000.00	360,000.00	360,000.00
1931		180,000.00	180,000.00	360,000.00	360,000.00
1932		180,000.00	180,000.00	360,000.00	360,000.00
1933		180,000.00	180,000.00	360,000.00	360,000.00
1934		180,000.00	180,000.00	360,000.00	360,000.00
1935		180,000.00	180,000.00	360,000.00	360,000.00
1936		180,000.00	180,000.00	360,000.00	360,000.00
1937		180,000.00	180,000.00	360,000.00	360,000.00
1938		180,000.00	180,000.00	360,000.00	360,000.00
1939		180,000.00	180,000.00	360,000.00	360,000.00
1940		180,000.00	180,000.00	360,000.00	360,000.00
1941		180,000.00	180,000.00	360,000.00	360,000.00
1942		180,000.00	180,000.00	360,000.00	360,000.00
1943		180,000.00	180,000.00	360,000.00	360,000.00
1944		180,000.00	180,000.00	360,000.00	360,000.00
1945	500,000.00	180,000.00	170,000.00	350,000.00	850,000.00
1946	500,000.00	170,000.00	160,000.00	330,000.00	830,000.00
1947	500,000.00	160,000.00	150,000.00	310,000.00	810,000.00
1948	500,000.00	150,000.00	140,000.00	290,000.00	790,000.00
1949	500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1950	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1951	500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1952	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1953	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1954	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1955	1,000,000.00	80,000.00	60,000.00	140,000.00	1,140,000.00
1956	1,000,000.00	60,000.00	40,000.00	100,000.00	1,100,000.00
1957	1,000,000.00	40,000.00	20,000.00	60,000.00	1,060,000.00
1958	1,000,000.00	20,000.00		20,000.00	1,020,000.00
Total	$9,000,000.00	$4,430,000.00	$4,310,000.00	$8,740,000.00	$17,740,000.00

TABLE 92—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 10—$7,000,000.00—4% BONDS.

Date of sale—November 8, 1928. Date of issue—November 1, 1928. Rate $97.55. Yield 4.15.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1928					
1929		$140,000.00	$140,000.00	$280,000.00	$ 280,000.00
1930		140,000.00	140,000.00	280,000.00	280,000.00
1931		140,000.00	140,000.00	280,000.00	280,000.00
1932		140,000.00	140,000.00	280,000.00	280,000.00
1933		140,000.00	140,000.00	280,000.00	280,000.00
1934		140,000.00	140,000.00	280,000.00	280,000.00
1935		140,000.00	140,000.00	280,000.00	280,000.00
1936		140,000.00	140,000.00	280,000.00	280,000.00
1937		140,000.00	140,000.00	280,000.00	280,000.00
1938		140,000.00	140,000.00	280,000.00	280,000.00
1939		140,000.00	140,000.00	280,000.00	280,000.00
1940		140,000.00	140,000.00	280,000.00	280,000.00
1941		140,000.00	140,000.00	280,000.00	280,000.00
1942		140,000.00	140,000.00	280,000.00	280,000.00
1943		140,000.00	140,000.00	280,000.00	280,000.00
1944		140,000.00	140,000.00	280,000.00	280,000.00
1945		140,000.00	140,000.00	280,000.00	280,000.00
1946		140,000.00	140,000.00	280,000.00	280,000.00
1947		140,000.00	140,000.00	280,000.00	280,000.00
1948		140,000.00	140,000.00	280,000.00	280,000.00
1949		140,000.00	140,000.00	280,000.00	280,000.00
1950		140,000.00	140,000.00	280,000.00	280,000.00
1951		140,000.00	140,000.00	280,000.00	280,000.00
1952		140,000.00	140,000.00	280,000.00	280,000.00
1953	$ 500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1954	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1955	1,000,000.00	120,000.00	100,000.00	220,000.00	1,220,000.00
1956	1,000,000.00	100,000.00	80,000.00	180,000.00	1,180,000.00
1957	2,000,000.00	80,000.00	40,000.00	120,000.00	2,120,000.00
1958	2,000,000.00	40,000.00		40,000.00	2,040,000.00
Total	$7,000,000.00	$3,970,000.00	$3,830,000.00	$7,800,000.00	$14,800,000.00

TABLE 93—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 11—$10,000,000.00—4% BONDS.

Date of sale—June 17, 1929. Date of issue—June 1, 1929. Rate $93.776. Yield 4.43.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at Mar. 1 each year.	Interest on this series payable at Mar. 1 each year.	Interest on this series payable at Sept. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1929			$100,000.00	$100,000.00	$ 100,000.00
1930		$200,000.00	200,000.00	400,000.00	400,000.00
1931		200,000.00	200,000.00	400,000.00	400,000.00
1932		200,000.00	200,000.00	400,000.00	400,000.00
1933		200,000.00	200,000.00	400,000.00	400,000.00
1934		200,000.00	200,000.00	400,000.00	400,000.00
1935		200,000.00	200,000.00	400,000.00	400,000.00
1936		200,000.00	200,000.00	400,000.00	400,000.00
1937		200,000.00	200,000.00	400,000.00	400,000.00
1938		200,000.00	200,000.00	400,000.00	400,000.00
1939		200,000.00	200,000.00	400,000.00	400,000.00
1940		200,000.00	200,000.00	400,000.00	400,000.00
1941		200,000.00	200,000.00	400,000.00	400,000.00
1942		200,000.00	200,000.00	400,000.00	400,000.00
1943		200,000.00	200,000.00	400,000.00	400,000.00
1944		200,000.00	200,000.00	400,000.00	400,000.00
1945	$ 500,000.00	200,000.00	190,000.00	390,000.00	890,000.00
1946	500,000.00	190,000.00	180,000.00	370,000.00	870,000.00
1947	500,000.00	180,000.00	170,000.00	350,000.00	850,000.00
1948	500,000.00	170,000.00	160,000.00	330,000.00	830,000.00
1949	500,000.00	160,000.00	150,000.00	310,000.00	810,000.00
1950	500,000.00	150,000.00	140,000.00	290,000.00	790,000.00
1951	500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1952	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1953	500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1954	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1955	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1956	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1957	500,000.00	80,000.00	70,000.00	150,000.00	650,000.00
1958	500,000.00	70,000.00	60,000.00	130,000.00	630,000.00
1959	3,000,000.00	60,000.00		60,000.00	3,060,000.00
Total	$10,000,000.00	$4,950,000.00	$4,850,000.00	$9,800,000.00	$19,800,000.00

TABLE 94—$100,000,000.00 BOND ISSUE HIGHWAY BOND RETIREMENT AND INTEREST CALCULATION—SERIES NO. 12—$11,000,000.00—4% BONDS.

Date of sale—September 11, 1929. Date of issue—September 1, 1929. Rate $92.627. Yield 4.50.

Year in which principal is to be retired and interest paid.	Principal of this series to be retired at May 1 each year.	Interest on this series payable at May 1 each year.	Interest on this series payable at Nov. 1 each year.	Total interest this series payable each year.	Total this series payable each year.
1929			$ 73,333.33	$ 73,333.33	$ 73,333.33
1930		$220,000.00	220,000.00	440,000.00	440,000.00
1931		220,000.00	220,000.00	440,000.00	440,000.00
1932		220,000.00	220,000.00	440,000.00	440,000.00
1933		220,000.00	220,000.00	440,000.00	440,000.00
1934		220,000.00	220,000.00	440,000.00	440,000.00
1935		220,000.00	220,000.00	440,000.00	440,000.00
1936		220,000.00	220,000.00	440,000.00	440,000.00
1937		220,000.00	220,000.00	440,000.00	440,000.00
1938		220,000.00	220,000.00	440,000.00	440,000.00
1939		220,000.00	220,000.00	440,000.00	440,000.00
1940		220,000.00	220,000.00	440,000.00	440,000.00
1941		220,000.00	220,000.00	440,000.00	440,000.00
1942		220,000.00	220,000.00	440,000.00	440,000.00
1943		220,000.00	220,000.00	440,000.00	440,000.00
1944		220,000.00	220,000.00	440,000.00	440,000.00
1945	$ 500,000.00	220,000.00	210,000.00	430,000.00	930,000.00
1946	500,000.00	210,000.00	200,000.00	410,000.00	910,000.00
1947	500,000.00	200,000.00	190,000.00	390,000.00	890,000.00
1948	500,000.00	190,000.00	180,000.00	370,000.00	870,000.00
1949	500,000.00	180,000.00	170,000.00	350,000.00	850,000.00
1950	500,000.00	170,000.00	160,000.00	330,000.00	830,000.00
1951	500,000.00	160,000.00	150,000.00	310,000.00	810,000.00
1952	500,000.00	150,000.00	140,000.00	290,000.00	790,000.00
1953	500,000.00	140,000.00	130,000.00	270,000.00	770,000.00
1954	500,000.00	130,000.00	120,000.00	250,000.00	750,000.00
1955	500,000.00	120,000.00	110,000.00	230,000.00	730,000.00
1956	500,000.00	110,000.00	100,000.00	210,000.00	710,000.00
1957	500,000.00	100,000.00	90,000.00	190,000.00	690,000.00
1958	500,000.00	90,000.00	80,000.00	170,000.00	670,000.00
1959	4,000,000.00	80,000.00		80,000.00	4,080,000.00
Total	$11,000,000.00	$5,550,000.00	$5,403,333.33	$10,953,333.33	$21.953.333.33

TABLE 95—BOND FUND REVENUE DEPOSITED WITH STATE TREASURER DERIVED FROM SALE OF $98,000,000.00 OF THE $100,000,000.00 BOND ISSUE.

Year sold.	Date sold.	Sale rate.	Interest yield.	Amount sold.	Amount derived.	Amount deposited in bond fund.	Accrued interest deposited in road fund.
1924	Dec. 30	97.557	4.29	$ 4,000,000.00	$ 3,913,411.20	$ 3,902,300.00	$ 11,111.20
1925	May 20	99.881	4.008	10,000,000.00	10,088,100.00	9,988,100.00	100,000.00
1925	Sept. 1	96.422	4.24	10,000,000.00	9,845,533.33	9,642,200.00	203,333.33
1926	Feb. 17	99.062	4.062	5,000,000.00	4,971,988.89	4,953,100.00	18,888.89
1927	April 26	101.601	3.895	6,000,000.00	6,099,286.67	6,096,100.00	3,186.67
1927	Oct. 11	101.016	3.93	6,000,000.00	6,076,800.00	6,061,000.00	15,800.00
1928	May 15	99.321	4.045	7,000,000.00	6,973,297.78	6,952.500.00	20,797.78
1928	July 17	96.266	4.225	13,000,000.00	12,556,488.89	12,514,600.00	41,888.89
1928	Sept. 18	97.255	4.185	9,000,000.00	8,784,000.00	8,753,000.00	31,000.00
1928	Nov. 8	97.55	4.15	7,000,000.00	6,842,500.00	6,828,500.00	14,000.00
1929	June 17	93.776	4.43	10,000,000.00	9,407,600.00	9,377,600.00	30,000.00
1929	Sept. 11	92.627	4.50	11,000,000.00	10,219,555.56	10,189,000.00	30,555.56
Total		97.202	4.115	$98,000,000.00	$95,778,562.32	$95,258,000.00	$520,562.32

TABLE 96—APPROPRIATIONS PAYABLE FROM $100,000,000.00 BOND ISSUE FUND.

Year.	For construction.	Amount lapsed October 1, 1925.	Amount lapsed October 1, 1927.	Amount lapsed October 1, 1929.
1923	$100,000,000.00	$96,000,000.00		
1925	96,000,000.00		$65,419,289.57	
1927	60,000,000.00			$17,480,577.81
1929	23,000,000.00			
Total	$279,000,000.00	$96,000,000.00	$65,419,289.57	$17,480,577.81

TABLE 97—EXPENDITURES FROM $100,000,000.00 BOND ISSUE FUND—1925 TO 1929.

Year.	Administration and engineering.	Federal aid and S. B. I. construction.	Surfacing of gaps and detours.	Additions and betterments.	Total.
1925	$1,911,411.30	$19,660,647.25	$28,385.40	$ 62,484.33	$21,662,928.28
1926	973,454.51	5,788,402.61	25,850.88	34,860.07	6,822,568.07
1927	1,156,027.51	10,492,365.61	19,680.83	75,877.38	11,743,951.33
1928	1,406,144.61	32,874,457.50	7,132.71	134,937.50	34,422,672.32
1929	1,068,218.56	16,356,728.86	2,284.03	34,201.79	17,461,433.24
Total	$6,515,256.49	$85,172,601.83	$83,333.85	$342,361.07	$92,113,553.24

TABLE 98—STATEMENT SHOWING $100,000,000.00 BOND FUND BALANCES, RECEIPTS AND EXPENDITURES BY MONTHS FOR THE CALENDAR YEAR 1929.

Month.	Balance at beginning of month.	Receipts during month.	Per cent of total receipts.	Total.
January	$1,039,280.00			$1,039,280.00
February	79,568.26			79,568.26
March	236.74			236.74
April	236.74			236.74
May	236.74			236.74
June	236.74	$ 9,377,600.00	47.93	9,377,836.74
July	9,377,836.74			9,377,836.74
August	5,444,103.28			5,444,103.28
September	1,297,586.33	10,189,000.00	52.07	11,486,586.33
October	8,334,432.59			8,334,432.59
November	5,640,157.47			5,640,157.47
December	4,301,533.19			4,301,533.19
Total	$1,039,280.00	$19,566,600.00	100.00	$20,605,880.00

TABLE 98—Concluded.

Month.	Expenditures during month.	Per cent of total expenditures.	Balance at end of month.
January	$ 959,711.74	5.50	$ 79,568.26
February	79,331.52	.45	236.74
March			236.74
April			236.74
May			236,74
June			9,377,836.74
July	$3,933,733.46	22.53	5,444,103.28
August	4,146,516.95	23.74	1,297,586.33
September	3,152,153.74	18.05	8,334,432.59
October	2,694,275.12	15.43	5,640,157.47
November	1,338,624.28	7.67	4,301,533.19
December	1,157,086.43	6.63	3,144,446.76
Total	$17,461,433.24	100.00	$3,144,446.76

TABLE 99—APPROPRIATIONS PAYABLE FROM GENERAL REVENUE FUND AS MADE BY THE 54TH, 55TH AND 56TH GENERAL ASSEMBLIES.

Year.	For construction of road from Banner to Copperas Creek Lock.			For construction of bridge at Pekin.		
	54th G. A., H. B. 502.	55th G. A., S. B. 394.	56th G. A., H. B. 759.	54th G. A., H. B. 251.	55th G. A., S. B. 394.	56th G. A., H. B. 759.
1925	$75,271.00			$400,000.00		
1927	*	$66,834.98		*	$400,000.00	
1929		*	$33,860.07		*	$181,901.43
Total	$75,271.00	$66,834.98	$33,860.07	$400,000.00	$400,000.00	$181,901.43

* Re-appropriation.

TABLE 99—Continued.

Year.	For construction of bridge at Carlyle.		For construction of bridge at Hardin, 55th G. A., H. B. 112.	For construction of Soldiers' Widows' Home road, 55th G. A., S. B. 33.	For construction of roads connecting bond issue routes, 55th G. A., S. B. 566.	For construction of road connecting Fort Massac with the State highway system, 55th G. A., S. B. 102.
	55th G. A., H. B. 99.	56th G. A., H. B. 578.				
1925						
1927	$150,000.00		$400,000.00	$25,000.00	$125,000.00	$30,000.00
1929	*	$137,957.44				
Total	$150,000.00	$137,957.44	$400,000.00	$25,000.00	$125,000.00	$30,000.00

* Re-appropriation.

TABLE 99—Concluded.

Year.	For construction of drives and walks at Soldiers' and Sailors' Home, 55th G. A., H. B. 211.	For construction of bridge at Mt. Carmel 56th G. A., H. B. 142.	Construction of road to west entrance Starved Rock Park, 56th G. A., S. B. 268.	Mechanical, testing, engineering and other services to State departments, 56th G. A., H. B. 798.	Refund for certain property owners, city of Lockport, 56th G. A., H. B. 319.	Refund for certain property owners, city of Plainfield, 56th G. A., H. B. 319.	Total.
1925							$ 475,271.00
1927	$75,000.00						1,271,834.98
1929		$370,000.00	$49,000.00	$75,000.00	$28,094.70	$25,000.00	900,813.64
Total	$75,000.00	$370,000.00	$49,000.00	$75,000.00	$28,094.70	$25,000.00	$2,647,919.62

TABLE 100—STATEMENT SHOWING EXPENDITURES FROM 55TH G. A. AND 56TH G. A. REVENUE FUND APPROPRIATIONS DURING THE CALENDAR YEAR 1929.

Month.	Banner to Copperas Creek Road, re-appropriations, S. B. 394, H. B. 759.	To connect roads with bond routes, S. B. 566.	Construction of drives and walks, H. B. 211.	Bridge at Pekin, re-appropriations, S. B. 394, H. B. 759.	Bridge at Carlyle, re-appropriations, H. B. 99, H. B. 578.
January	$ 318.35			$23,050.98	
February				14,549.66	
March				22,283.03	
April		$9,297.55		17,682.18	
May				1,372.14	11,732.36
June			4,279.69	47,242.47	310.20
July		4,700.37		26,521.88	5,990.29
August	11,083.99			18,631.03	2,267.10
September				444.00	17,104.58
October				13,174.79	16,664.56
November				31,105.18	16,878.21
December					6,932.18
Total	$11,402.34	$13,997.92	$4,279.69	$216,057.34	$77,879.48

TABLE 100—Concluded.

Month.	Mechanical, testing, engineering and other services to State departments, H. B. 798.	Refund for certain property owners, city of Lockport, H. B. 319.	Refund for certain property owners, village of Plainfield, H. B. 319.	Total.
January				$23,369.33
February				14,549.66
March				22,283.03
April				26,979.73
May				13,104.50
June				51,832.36
July				37,212.54
August				31,982.12
September	$1,305.45			18,854.03
October	1,554.44	$28,094.70		59,488.49
November	1,821.60		15,683.74	65,488.73
December	1,944.72			8,876.90
Total	$6,626.21	$28,094.70	$15,683.74	$374,021.42

TABLE 101—STATEMENT SHOWING REVENUE FUND RECEIPTS AND EXPENDITURES BY MONTHS FOR THE CALENDAR YEAR 1929.

Month.	Receipts during month.	Per cent of total receipts.	Expenditures during month.	Per cent of total expenditures.
January	$23,369.33	6.25	$23,369.33	6.25
February	14,549.66	3.89	14,549.66	3.89
March	22,283.03	5.96	22,283.03	5.96
April	26,979.73	7.21	26,979.73	7.21
May	13,104.50	3.50	13,104.50	3.50
June	51,832.36	13.86	51,832.36	13.86
July	37,212.54	9.95	37,212.54	9.95
August	31,982.12	8.55	31,982.12	8.55
September	18,854.03	5.04	18,854.03	5.04
October	59,488.49	15.91	59,488.49	15.91
November	65,488.73	17.51	65,488.73	17.51
December	8,876.90	2.37	8,876.90	2.37
Total	$374,021.42	100.00	$374,021.42	100.00

TABLE 102—STATEMENT SHOWING MOTOR FUEL TAX FUND REVENUE DEPOSITED IN STATE TREASURY FROM AUGUST 1, 1929 TO DECEMBER 31, 1929.

(Law Became Effective August 1, 1929.)

Month.	Amount.
August	....
September	$ 20,473.22
October	743,899.16
November	373,484.31
December	478,328.37
Total	$1,616,185.06

TABLE 103—APPROPRIATIONS PAYABLE FROM MOTOR FUEL TAX FUND AS MADE BY THE 56TH GENERAL ASSEMBLY.

Year.	For construction of State highways, 56th G. A., S. B. 85.	For construction of grade separations, 56th G. A., S. B. 85.	For widening, improving and reconstructing, 56th G. A., S. B. 85.	Total.
1929	$23,670,000.00	$2,000,000.00	$7,500,000.00	$33,170,000.00

TABLE 104—STATEMENT SHOWING EXPENDITURES FROM THE MOTOR FUEL TAX FUND BY THE DEPARTMENT OF FINANCE FROM AUGUST 1, 1929 TO DECEMBER 31, 1929.

Month.	Administration of Motor Fuel Tax Act.
August	....
September	$2,316.75
October	3,440.08
November	1,869.64
December	3,515.33
Total	$11,141.80

TABLE 105—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 766.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bond	$114,837.53	$114,837.53	
Boone	3,937.34		$ 3,937.34
Bureau	6,836.42		6,836.42
Cass	5,851.17		5,851.17
Champaign	74,453.33	22,629.13	51,824.20
Clark	126,259.34	126,258.68	.66
Clinton	6,745.00		6,745.00
Coles	36,876.16		36,876.16
Cook	687,935.42	498,954.97	188,980.45
Crawford	10,014.12		10,014.12
Cumberland	94,209.95	92,312.41	1,896.64
DeKalb	51,509.00	51,509.00	
Douglas	8,993.93		8,993.93
DuPage	82,042.00	82,042.00	
Edgar	1,577.20		1,577.20
Edwards	1,498.69		1,498.69
Effingham	106,181.45	98,590.35	7,591.10
Fayette	160,526.53	147,258.26	13,268.27
Fulton	28,585.10		28,585.10
Iroquois	65,788.51	65,788.39	.12
Jasper	3,350.74		3,357.40
Jefferson	4.168.35		4,168.35
Kane	113,639.55	113,639.55	
Kankakee	13,239.47	13,239.47	
Lake	143,681.62	143,681.62	
Lawrence	6,373.44		6,373.44
Lee	75,726.00	75,708.81	17.19
Livingston	13,119.87		13,119.87
Logan	3,058.65		3,058.65
Macoupin	73,176.31	17,495.88	55,680.43
Madison	206,032.34	174,200.20	31,832.14
Mason	55,882.46		55,882.46
Menard	51,117.01		51,117.01
Mercer	3,870.00		3,870.00
Monroe	7,035.04		7,035.04
Morgan	7,996.07		7,996.07
Ogle	47,816.63	12,597.86	35,218.77
Peoria	69,285.00	69,043.80	241.20
Piatt	21,027.69		21,027.69
Rock Island	4,650.54		4,650.54
St. Clair	84,210.92	84,210.92	
Sangamon	131,067.24	123,457.62	7,609.62
Schuyler	14,033.49		14,033.49
Stephenson	20,571.79		20,571.79
Tazewell	145,468.89	132,835.12	12,633.77
Vermilion	651,044.41	544,156.60	106,887.81
Warren	41,142.06	31,470.74	9,671.32
Whiteside	75,460.88	73,622.25	1,838.63
Will	21,521.00	16,600.68	4,920.32
Williamson	62,392.88		62,392.88
Winnebago	43,594.60	43,594.60	
Total	$3,889,382.23	$2,969,736.44	$919,645.79

TABLE 106—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FORRE FUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 867.

County.	Amount appropriated.	Amounts refunded.	Amount lapsed Oct. 1, 1923.
Bureau	$ 6,055.66		$ 6,055.66
Carroll	15,090.56		15,090.56
Clinton	6,745.00		6,745.00
Coles	7,869.21		7,869.21
Cook	492,675.23	$ 18,268.01	474,407.22
DeKalb	60,841.26	3,450.76	57,390.50
Edgar	15,298.92		15,298.92
Franklin	10,493.36		10,493.36
Fulton	8,030.00		8,030.00
Grundy	75,252.00	50,000.00	25,252.00
Jackson	5,909.92		5,909.92
Jersey	2,930.72		2,930.72
JoDaviess	20,763.69		20,763.69
Kane	84.480.35	72,448.07	12,032.28
Kankakee	62,881.21	62,881.21	
Lake	388,961.15	337,156.27	51,804.88
LaSalle	114,736.57		114,736.57
Lawrence	19,757.21		19,757.21
Lee	25,004.86		25,004.86
Livingston	13,912.26		13,912.26
McHenry	10,647.17		10,647.17
Macoupin	127,876.00		127,876.00
Madison	389,115.77	234,129.24	154,986.53
Marshall	4,307.27		4,307.27
Menard	58,894.30	25,000.00	33,894.30
Ogle	26,288.20		26,288.20
Peoria	170.329.32		170,329.32
Rock Island	15,558.05		15,558.05
St. Clair	133,153.61	118,506.05	14,647.56
Sangamon	164,639.00	156,009.58	8,629.42
Shelby	18,573.03		18,573.03
Whiteside	4,732.04		4,732.04
Will	183,290.57	165,712.27	17,578.30
Winnebago	124,196.40	70,323.39	53,873.01
Total	$2,869,289.87	$1,313,884.85	$1,555,405.02

TABLE 107—STATEMENT SHOWING THE AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, HOUSE BILL 822.

County.	Amount appropriated,	Amounts refunded.	Amount lapsed Oct. 1, 1925.
Adams	$ 16,256.06		$ 16,256.06
Bond	4,438.92	$ 4,438.02	
Boone	3,762.32	3,762.32	
Bureau	12,894.26	12,854.54	39.72
Carroll	10,024.77	6,551.10	3,473.67
Cass	5,851.17		5,851.17
Champaign	51,746.58	48,535.18	3,211.40
Coles	33,738.22	32,480.92	1,257.30
Cook	984,393.21	720,389.28	264,003.93
Cumberland	6,261.78		6,261.78
DeKalb	58,192.39	23,381.70	34,810.69
DuPage	45,207.17	40,858.47	4,348.70
Edgar	16,876.12	14,148.08	2,728.04
Edwards	1,498.69		1,498.69
Effingham	5,656.37	3,918.26	1,738.11
Ford	5,738.29		5,738.29
Fulton	33,123.80	32,540.30	583.50
Grundy	55,734.87	30,734.87	25,000.00
Iroquois	18,843.00		18,843.00
Jersey	2,930.72		2,930.72
Kane	393,922.37	165,972.21	227,950.16
Kankakee	21,044.78	17,968.30	3,076.48
LaSalle	27,281.15		27,281.15
Lake	214,144.81	85,625.17	128,519.64
Lee	25,004.86	25,004.86	
Livingston	19,160.77	19,160.77	
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Macoupin	162,902.24	162,406.36	495.88
Madison	302,991.28	172,847.39	130,143.89
Marion	1,593.66		1,593.66
Marshall	45,601.86		45,601.86
Mason	54,066.22	54,066.22	
McHenry	10,191.63		10,191.63
Menard	44,773.74	26,242.44	18,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.04	1,000.00	6,035.04
Morgan	7,966.07		7,966.07
Ogle	78,613.10	64,767.39	13,845.71
Peoria	122,739.77	80,818.16	41,921.61
Piatt	11,235.62	11,235.62	
Pike	8,325.16		8,325.16
Putnam	19,073.92	7,000.00	12,073.92
Rock Island	3,029.82		3,029.82
Schuyler	17,583.40	6,929.94	10,653.46
Shelby	17,366.56		17,366.56
St. Clair	483,564.11	483,339.78	224.33
Stephenson	12,838.53	12,838.53	
Tazewell	12,633.48		12,633.48
Vermilion	155,526.79		155,526.79
Warren	38,405.66		38,405.66
Whiteside	4,732.04	4,732.04	
Will	194,128.06	100,340.09	93,787.97
Williamson	66,863.40	55,169.70	11,693.70
Winnebago	61,468.68	61,468.68	
Total	$4,025,632.56	$2,593,527.59	$1,432,104.97

TABLE 108—STATEMENT SHOWING AMOUNTS APPROPRIATED FOR REFUNDS TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM, SENATE BILL 515.

County.	Amount appropriated.	Amounts refunded.	Balance Dec. 31, 1927.
Adams	$ 16,256.07		$ 16,256.07
Carroll	4,000.00	$ 3,145.84	854.16
Cass	3,450.54	3,450.54	
Coles	1,888.97	1,888.97	
Cook	505,985.35		505,985.35
Douglas	2,949.33	2,949.33	
Edwards	1,498.69	1,498.69	
Effingham	6,297.35	5,058.90	1,238.45
Ford	5,738.29		5,738.29
Fulton	32,540.30		32,540.30
Iroquois	7,498.00	7,498.00	
Jackson	942.00		942.00
Jefferson	1,125.28		1,125.28
Jersey	2,930.72	1,836.64	1,094.08
JoDaviess	20,763.69		20,763.69
Kane	248,924.77	180,296.18	68,628.59
Kankakee	147,419.17	147,419.17	
Lake	50,000.00	41,625.86	8,374.14
LaSalle	21,566.89		21,566.89
Lee	25,004.86		25,004.86
Livingston	26,445.09	7,421.01	19,024.08
Logan	1,166.42		1,166.42
Macon	1,618.85		1,618.85
Madison	23,054.63	22,463.23	591.40
Marion	1,895.40		1,895.40
Marshall	45,598.82		45,598.82
Mason	63,814.17		63,814.17
McHenry	10,161.59	10,161.59	
McLean	47,356.52		47,356.52
Menard	3,531.30		3,531.30
Mercer	3,870.00		3,870.00
Monroe	7,035.03	6,035.03	1,000.00
Morgan	7,966.07	7,966.07	
Peoria	46,529.39	44,467.72	2,061.67
Piatt	11,235.62		11,235.62
Pike	8,066.39		8,066.39
Putnam	19,073.92	12,000.00	7,073.92
Rock Island	2,746.47	2,746.47	
Sangamon	572,109.87		572,109.87
Schuyler	25,802.02	2,845.86	22,956.16
Shelby	17,554.03	17,554.03	
St. Clair	449,998.24	284,477.40	165,520.84
Stephenson	7,726.37		7,726.37
Tazewell	12,633.48	12,633.48	
Vermilion	19,500.00		19,500.00
Will	109,415.59	109,415.59	
Williamson	52,133.40		52,133.40
Total	$2,704,818.95	$936,855.60	$1,767,963.35

TABLE 109—STATEMENT SHOWING AMOUNTS REFUNDED TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM FROM APPROPRIATION OF $3,000,000.00, S. B. 395, AVAILABLE JULY 1, 1927.

Lump sum appropriation available July 1, 1927		$3,000,000.00
Less—Refunds to Counties:		
County—		
Champaign	$ 10,734.95	
Cook	221,761.38	
Douglas	101,004.29	
Fulton	68,919.63	
Grundy	39,266.58	
Iroquois	37,292.12	
Kane	433,812.10	
Kankakee	20,973.12	
LaSalle	21,529.05	
Livingston	74,186.47	
McLean	47,276.88	
Peoria	140,941.86	
Pike	8,066.39	
Sangamon	289,000.00	
Schuyler	1,128.99	
St. Clair	452,383.61	
Williamson	43,600.87	
		2,011,878.29
Appropriation lapsed, October 1, 1929		$988,121.71

TABLE 110—STATEMENT SHOWING AMOUNTS REFUNDED TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM FROM APPROPRIATION OF $2,500,000.00, S. B. 311, AVAILABLE JULY 1, 1929.

Lump sum appropriation available July 1, 1929		$2,500,000.00
Less—Refunds to Counties:		
County—		
Peoria	$36,184.71	
Sangamon	28,996.48	
Vermilion	67,015.60	
Warren	10,000.00	
		142,196.79
Balance in appropriation, December 31, 1929		$2,357,803.21

TABLE 111—STATEMENT SHOWING THE AMOUNTS REFUNDED TO COUNTIES FOR THEIR SHARE OF COST OF SECTIONS INCORPORATED IN THE STATE BOND ISSUE SYSTEM TO DECEMBER 31, 1929.

County.	52d G. A. House Bill 766.	52d G. A. House Bill 867.	53d G. A. House Bill 822.	54th G. A. Senate Bill 515.	55th G. A. Senate Bill 395.	56th G. A. Senate Bill 311.	Total.
Bond	$114,837.53		$ 4,438.92				$ 119,276.45
Boone			3,762.32				3,762.32
Bureau			12,854.54				12,854.54
Carroll			6,551.10	$ 3,145.84			9,696.94
Cass				3,450.54			3,450.54
Champaign	22,629.13		48,535.18		$ 10,734.95		81,899.26
Clark	126,258.68						126,258.68
Coles			32,480.92	1,888.97			34,369.89
Cook	498,954.97	$ 18,268.01	720,389.28		221,761.38		1,459,373.64
Cumberland	92,312.41						92,312.41
DeKalb	51,509.00	3,450.76	23,381.70				78,341.46
Douglas				2,949.33	101,004.29		103,953.62
DuPage	82,042.00		40,858.47				122,900.47
Edgar			14,148.08				14,148.08
Edwards				1,498.69			1,498.69
Effingham	98,590.35		3,918.26	5,058.90			107,567.51
Fayette	147,258.26						147,258.26
Fulton			32,540.30		68,919.63		101,459.93
Grundy		50,000.00	30,734.87		39,266.58		120,001.45
Iroquois	65,788.39			7,498.00	37,292.12		110,578.51
Jersey				1,836.64			1,836.64
Kane	113,639.55	72,448.07	165,972.21	180,296.18	433,812.10		966,168.11
Kankakee	13,239.47	62,881.21	17,968.30	147,419.17	20,973.12		262,481.27
Lake	143,681.62	337,156.27	85,625.17	41,625.86			608,088.92
LaSalle					21,529.05		21,529.05
Lee	75,708.81		25,004.86				100,713.67
Livingston			19,160.77	7,421.01	74,186.47		100,768.25
Macoupin	17,495.88		162,406.36				179,902.24
Madison	174,200.20	234,129.24	172,847.39	22,463.23			603,640.06
Mason			54,066.22				54,066.22
McHenry				10,161.59			10,161.59
McLean					47,276.88		47,276.88
Menard		25,000.00	26,242.44				51,242.44
Monroe			1,000.00	6,035.03			7,035.03
Morgan				7,966.07			7,966.07
Ogle	12,597.86		64,767.39				77,365.25
Peoria	69,043.80		80,818.16	44,467.72	140,941.86	$36,184.71	371,456.25
Piatt			11,235.62				11,235.62
Pike					8,066.39		8,066.39
Putnam			7,000.00	12,000.00			19,000.00
Rock Island				2,746.47			2,746.47

Sangamon	123,457.62	156,009.58			289,000.00	28,996.48	597,463.68
Schuyler			6,929.94	2,845.86	1,128.99		10,904.79
Shelby				17,554.03			17,554.03
St. Clair	84,210.92	118,506.05	483,339.78	284,477.40	452,383.61		1,422,917.76
Stephenson			12,838.53				12,838.53
Tazewell	132,835.12			12,633.48			145,468.60
Vermilion	544,156.60					67,015.60	611,172.20
Warren	31,470.74					10,000.00	41,470.74
Whiteside	73,622.25		4,732.04				78,354.29
Will	16,600.68	165,712.27	100,340.09	109,415.59			392,068.63
Williamson			55,169.70		43,600.87		98,770.57
Winnebago	43,594.60	70,323.39	61,468.68				175,386.67
Grand total	$2,969,736.44	$1,313,884.85	$2,593,527.59	$936,855.60	$2,011,878.29	$142,196.79	$9,968,079.56

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TABLE 112—STATEMENT SHOWING TOTAL REFUNDS TO MUNICIPALITIES FROM JULY 1, 1925 TO DECEMBER 31, 1929.

Route.	City.	Amount.
37	Benton	$31,213.95
4	Bloomington	6,612.48
2	Carbondale	5,896.08
13	Carbondale	15,578.87
4	Carlinville	5,734.70
10	Champaign	11,710.61
16	Charleston	11,532.06
11	Effingham	9,944.24
25	Effingham	2,464.63
6	Geneva	2,715.90
22	Geneva	4,993.66
11	Greenville	25,936.36
43	Havana	20,217.84
10	Jacksonville	4,837.39
37	Johnston City	21,915.36
28	Kewanee	47,495.25
3	Macomb	1,367.84
18	Naperville	9,356.20
4	Normal	14,000.38
2	Oglesby	12,116.96
2	Pana	22,213.74
24	Pana	10,835.59
6	Rochelle	24,970.41
27	Savanna	2,230.50
13	Sparta	23,206.48
22	St. Charles	23,264.10
25	Urbana	5,470.56
2	Vandalia	23,654.05
11	Vandalia	2,024.85
42	Waukegan	8,947.07
42	Zion	14,039.18
	Total	$426,497.29

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